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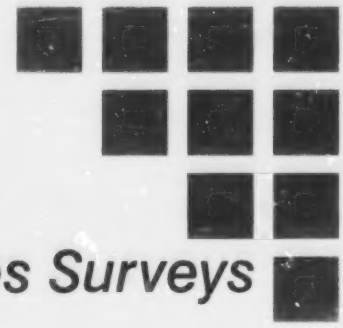


The National Graduates Surveys

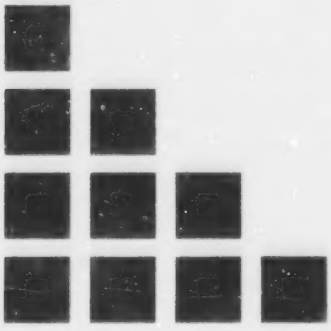
Gender Differences in Earnings Growth of Recent University Graduates in Canada:
Empirical Evidence from the National Graduates Surveys

R-00-1-2E

by
Michael Abbott, Ross Finnie and Ted Wannell

March 1999

Research Paper



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This report is part of a set of research studies on the National Graduates Surveys. /
Le présent rapport fait partie d'un ensemble d'études sur les Enquêtes nationales auprès de diplômés.

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Abstract

This study uses data from the National Graduates Surveys (NGS) to investigate empirically the post-graduation earnings growth of Bachelor's level university graduates in Canada for the NGS graduate cohorts of 1982, 1986 and 1990. It formulates and estimates empirical log-earnings growth equations that relate the change in graduates' log-earnings between the second and fifth post-graduation years to two sets of observed covariates: time-invariant baseline characteristics of graduates and their degree programs; and time-varying current characteristics of graduates and their jobs.

The following questions are of particular interest:

- *What are the factors related to graduates' earnings growth in general?*
  Of the time-invariant baseline characteristics, graduates' field of study in their Bachelor's degree programs is the one for which the estimated earnings growth effects are statistically the strongest and most uniform for both male and female graduates across the three NGS cohorts. Of graduates' time-varying current characteristics, full-time/part-time status (or usual weekly hours of work), occupation and industry yield the strongest evidence of regression-adjusted differences in post-graduation earnings growth for both male and female graduates.

- *Are the earnings growth effects of graduates' baseline and current characteristics similar or different for male and female graduates?*
  With respect to the earnings growth effects of graduates' time-invariant baseline characteristics, we find almost no evidence of male-female differences for any of the three graduate cohorts.

- *Have these relationships changed across successive graduate cohorts?*
  With respect to the earnings growth effects of graduates' time-varying current characteristics, we find fairly strong evidence of male-female differences for the 1986 and 1990 NGS cohorts, but not for the 1982 cohort.

- *What is the specific role of field of study in these dynamics?*
  Our findings respecting the effects of field of study on earnings growth differ depending on whether and how we control for the earnings growth effects of other measured covariates. we find no evidence of male-female differences in either the regression-adjusted or regression-unadjusted effects of field of study on post-graduation log-earnings growth rates. It can be tentatively concluded that male-female differences in post-graduation earnings growth are probably not attributable to male-female differences in the earnings growth effects of field of study. However, differences between the field of study distributions of male and female graduates could still play a role in explaining male-female differences in mean log-earnings growth.

Résumé

Cette étude utilise les données de l'Enquête nationale sur les diplômés (END) pour faire une analyse empirique de la croissance de la rémunération après l'obtention d'un baccalauréat pour les cohortes de diplômés universitaires des END de 1982, 1986 et 1990. Elle permet de formuler et d'estimer des équations empiriques de croissance du logarithme de revenu qui établissent le lien entre l'évolution du logarithme de revenu deux ans et cinq ans après l'obtention du diplôme et deux ensembles de covariables observées : les caractéristiques fondamentales invariantes des diplômés et de leurs programmes d'études; et les caractéristiques actuelles variables des diplômés et de leurs emplois.

Les questions qui suivent présentent un intérêt particulier :

- *Quels sont les facteurs associés à la croissance des revenus des diplômés d'une manière générale?*
  Parmi les caractéristiques fondamentales invariantes, le domaine d'études des détenteurs d'un baccalauréat est l'une de celles dont l'incidence estimée sur la croissance du revenu est statistiquement la plus forte et la plus semblable chez les hommes et chez les femmes pour les trois cohortes de l'END. Parmi les caractéristiques actuelles variables des diplômés, la situation de travailleur à temps plein ou à temps partiel (ou le nombre habituel d'heures de travail), la profession et l'industrie sont les éléments les plus susceptibles de causer des variations (avec facteur de régression) dans la croissance du revenu des diplômés et des diplômées.

- *Les effets des caractéristiques fondamentales et actuelles des diplômés sur la croissance du revenu sont-ils les mêmes pour les hommes et pour les femmes?*
  Pour ce qui est des effets des caractéristiques fondamentales invariantes des diplômés sur la croissance du revenu, nous ne constatons pour ainsi dire aucune différence entre les hommes et les femmes pour les trois cohortes étudiées.

- *Est-ce que les résultats ont évolué d'une cohorte de diplômés à une autre?*
  Pour ce qui est des effets des caractéristiques actuelles variables des diplômés sur la croissance du revenu, nous avons trouvé des indications assez concluantes de différences entre les hommes et les femmes pour les cohortes de 1986 et 1990 de l'END, mais pas pour la cohorte de 1982.

- *Quel rôle particulier joue le domaine d'études dans toute cette dynamique?*
  Nos constatations relativement aux effets du domaine d'études sur la croissance du revenu varient selon que nous examinons ou non les effets d'autres covariables mesurées et suivant la façon dont nous nous y prenons. Nous n'avons trouvé aucune indication de différence entre les hommes et les femmes pour ce qui est des effets (avec ou sans facteur de régression) du domaine d'études sur les taux de croissance du logarithme de revenu après l'obtention du diplôme. On peut proposer comme conclusion que les différences entre hommes et femmes au chapitre de la croissance du revenu après l'obtention du diplôme ne sont probablement pas attribuables aux différences entre les deux sexes pour ce qui est des effets du domaine d'études sur la croissance du revenu. Cependant, les différences dans la répartition des hommes et des femmes dans les différents domaines d'études pourraient tout de même contribuer à expliquer les différences entre les deux sexes au chapitre de la croissance moyenne du logarithme de revenu.

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1. Introduction

Most existing empirical research on the gender earnings gap has focused on male-female differences in mean earnings levels at a given point in time, both with and without controls for the observed earnings-related attributes of workers and their jobs, with this work typically based on micro cross-sectional data from population censuses and other household surveys.[1] Recently, however, longitudinal datasets which follow the same individuals over time have facilitated the study of evolution of the gender earnings gap for a given group of workers over time, while also permitting researchers to control for the effects on earnings of certain types of unobserved heterogeneity across individual workers ("fixed effects") or across periods of time ("period effects").

Two general findings of the recent research on male-female earnings differences in Canada and the United States are of particular relevance to the current research project. First, the gender earnings gap still exists for most groups of workers, even after controlling for observed personal, human capital, and job characteristics of workers, although the magnitude of the gap seems to have been gradually declining over time, especially for younger workers. Second, the male-female earnings differential increases over the life cycle, to at least some degree because female workers have different lifetime patterns of labour force participation and human capital investment (work experience, on-the-job training, job mobility, etc.).

In this context, recent and ongoing research by Finnie (1999a, b) and Finnie and Wannell (1999) on recent university and college graduates in Canada has found that the gender earnings gap has been declining over time across successive cohorts of graduates (from the class of 1982 through 1986 to 1990), but that it has increased significantly from the second to fifth year following graduation for each cohort, with this widening of the gap following graduation being as great for the most recent cohort as for the earlier ones. Thus, even though women's initial relative earnings levels have been increasing over time, their subsequent earnings trajectories apparently have not improved in similar fashion – an extremely interesting and important finding with

[1] Gunderson (1985, 1989) and Gunderson and Riddell (1990) provide good overviews of the gender earnings gap in Canada in terms of the relevant estimation issues, the empirical evidence, and the related policy issues, while more recent work includes Christofides and Swidinsky (1994), Doiron and Riddell (1994), Kidd and Shannon (1994, 1996), and Miller (1987).

particularly significant implications for longer-term gender earnings patterns, especially in light of evidence that the major portion of real lifetime earnings growth occurs during the first few years of young people's post-schooling careers (Murphy and Welch, 1990).

This finding that lower earnings growth for women relative to men commences very soon after completion of schooling and full-time entry into the labour force constitutes the point of departure for the current research project, with the general objective of this study being to investigate empirically the extent to which earnings growth rates of recent male and female Bachelor's level university graduates in Canada differ in the early years following university graduation, and the factors underlying these patterns.[2]

For these purposes, we employ the same National Graduates Surveys and Follow-Up (NGS) databases used by Finnie and Wannell (1999), representing large, representative samples of those who completed their post-secondary studies in 1982, 1986, and 1990. The NGS databases provide data on respondents as of two and five years following graduation, with this longitudinal dimension of the data supporting the dynamic nature of the analysis, while the availability of data for three distinct graduate cohorts permits comparisons of male-female differences earnings growth over time and for periods characterised by different labour market conditions. Finally, the fairly extensive set of variables available in the NGS files, in some cases rather uniquely related to the specific situation of graduates, allows for an interesting exploration of the factors which affect earnings growth of this particular population.

The primary focus of the paper is on identifying the observable correlates of post-graduation earnings growth for recent Bachelor's level university graduates in Canada based on a regression approach where the dependent variable is the change in (log) earnings from two to five years following graduation. The following questions are of particular interest: What are the factors related to graduates' earnings growth in general? Are these different for male and female graduates? Have these relationships changed across successive graduate cohorts? What is the specific role of field of study in these dynamics?

---

[2] The closest work in the existing literature is Loprest [1992], who uses American National Longitudinal Study of Youth data to look at earnings growth during the first four years of full-time work, focussing on the role of job mobility (change of employers and occupation) in this dynamic.

The paper is organized as follows. Section 2 presents the analytical framework; Section 3 describes the NGS data in general, the construction of the samples used, and a description of the variables used in this analysis; Section 4 provides some descriptive information on the earnings growth of the male and female Bachelor's graduates; Section 5 presents the estimates for the earnings growth equations summarizes their implications for the observable determinants of post-graduation earnings growth; and Section 6 concludes the paper with a summary of the major findings and some suggestions for further research.

2. Framework for Empirical Analysis

Our proposed approach to empirical analysis of post-graduation earnings growth can be broadly formulated in terms of a general fixed effects earnings regression model. In this section, we briefly outline the essential features of this model.

For each of the three graduate cohorts, the NGS data files distinguish three reference years: the year of graduation; the year of the first post-graduation interview two years after graduation; and the year of the second post-graduation interview five years after graduation. These three reference years serve to partition the entire five-year post-graduation period for each cohort into two sub-periods: the first post-graduation period from year of graduation to year of the first interview two years after graduation; and the second post-graduation period from year of first interview to year of second interview five years after graduation. For purposes of formulating our benchmark earnings model, it is notationally convenient to denote the year of graduation for a given graduate cohort as year t, the year of the first post-graduation interview as year t+2, and the year of the second post-graduation interview as year t+5. Let the annual earnings rate (in constant 1995 dollars) of graduate i in year t+2 be denoted as $E_{i,t+2}$; similarly, let the annual earnings rate of respondent i in year t+5 be denoted as $E_{i,t+5}$. The dependent variable in the earnings equations is the natural logarithm of each individual graduate's annual earnings rate. Accordingly, $y_{i,t+2} = \ln(E_{i,t+2})$ denotes the natural logarithm of the annual earnings rate for graduate i in year t+2 (i.e., for the job held at the first interview), and $y_{i,t+5} = \ln(E_{i,t+5})$ the natural logarithm of the annual earnings rate for graduate i in year t+5 (i.e., for the job held at the second interview).

For each gender group (males and females) and graduation cohort (1982, 1986, and 1990), the log-earnings equations for years t+2 and t+5 can be written in general as

$$y_{i,t+2} = X_{i,t+2}\beta_{t+2} + X_i\gamma_{t+2} + \alpha_i + \alpha_{t+2} + \varepsilon_{i,t+2} \quad (1)$$

$$y_{i,t+5} = X_{i,t+5}\beta_{t+5} + X_i\gamma_{t+5} + \alpha_i + \alpha_{t+5} + \varepsilon_{i,t+5} \quad (2)$$

$X_{i,t+2}$ is a vector of current (time-varying) characteristics containing observed year- and person-specific earnings determinants for graduate i in year t+2 and β_{t+2} is a corresponding coefficient

vector; similarly $X_{i,t+5}$ is a vector of observed year- and person-specific earnings determinants for graduate i in year t+5 and β_{t+5} is a corresponding coefficient vector. X_i is a vector of observed person-specific but time-invariant earnings determinants for person i in years t+2 and t+5, and γ_{t+2} and γ_{t+5} denote the coefficient vectors for X_i for years t+2 and t+5, respectively. Earnings equations (1) and (2) incorporate both individual fixed effects and year fixed effects to control for unobserved earnings determinants across individuals and over time. The individual fixed effects are represented by the individual-specific constants α_i, and the year fixed effects by the year-specific constants α_{t+2} and α_{t+5} (which correspond to the years of the first and second post-graduation interviews, respectively). Finally, $\varepsilon_{i,t+2}$ and $\varepsilon_{i,t+5}$ denote unobserved person- and year-specific random errors for graduate i in years t+2 and t+5, respectively. Note that equations (1) and (2) allow the coefficients of the observed earnings covariates X_i and $X_{i,t+5}$ to differ between the two years for which post-graduation data are available. Changes over time in the marginal earnings effects of the observed earnings determinants is one way in which male and female earnings may diverge or converge following graduation.

It is not possible to separately estimate the earnings *level* equations (1) and (2) in a fixed effects specification. As is well known, it is impossible to separately identify the coefficients of the time-invariant baseline characteristics (i.e., the coefficient vectors γ_{t+2} and γ_{t+5} of the person-specific time-invariant covariates X_i) and the individual fixed effects (i.e., the individual-specific constants α_i). The reason for this is that the individual-specific fixed effects completely capture the effects on earnings levels of all time-invariant person-specific covariates, thereby making it impossible to identify and estimate the partial earnings effects of the time-invariant baseline characteristics in X_i. The conventional approach to estimation in such cases is to estimate the earnings equation in differenced form by conventional OLS, since differencing over time eliminates the individual-specific constants α_i from the estimating equation. We therefore difference the earnings equations (1) and (2) by subtracting earnings equation (1) from earnings equation (2); this yields the log-earnings growth equation

$$\Delta y_{i,t+5} = X_{i,t+5}\beta_{t+5} - X_{i,t+2}\beta_{t+2} + X_i(\gamma_{t+5} - \gamma_{t+2}) + (\alpha_{t+5} - \alpha_{t+2}) + (\varepsilon_{i,t+5} - \varepsilon_{i,t+2}) \qquad (3)$$

where $\Delta y_{i,t+5} = y_{i,t+5} - y_{i,t+2}$ is the three-year log-earnings growth rate for graduate i between year t+2 (the initial interview) and year t+5 (the follow-up interview). Equation (3) relates the

three-year log-earnings growth rate for graduate i between the second and fifth post-graduation years to three sets of observable variables: (1) the vector $X_{i,t+2}$ of time-varying covariates for graduate i in year t+2; (2) the vector $X_{i,t+5}$ of time-varying covariates for graduate i in year t+5; and (3) the vector X_i of time-invariant covariates for graduate i. Note that the coefficients associated with the time-invariant X_i variables represent differences in the marginal effects of these variables between the second and fifth post-graduation years; if these marginal effects are constant over time – i.e., if $\gamma_{t+5} = \gamma_{t+2}$ – then graduates' earnings growth after graduation is unrelated to their time-invariant baseline characteristics.

Although the earnings growth equation (3) can be estimated as it stands, it may be instructive to reformulate it by simultaneously adding to and subtracting from the right-hand side the term $X_{i,t+2}\beta_{t+5}$. After some straightforward rearrangement, equation (3) can then be rewritten as

$$\begin{aligned}\Delta y_{i,t+5} &= (X_{i,t+5} - X_{i,t+2})\beta_{t+5} + X_{i,t+2}(\beta_{t+5} - \beta_{t+2}) + X_i(\gamma_{t+5} - \gamma_{t+2}) + (\alpha_{t+5} - \alpha_{t+2}) + (\varepsilon_{i,t+5} - \varepsilon_{i,t+2}) \\ &= \Delta X_{i,t+5}\beta_{t+5} + X_{i,t+2}\Delta\beta_{t+5} + X_i\Delta\gamma_{t+5} + \Delta\alpha_{t+5} + u_{i,t+5} \qquad (4)\end{aligned}$$

where $\Delta X_{i,t+5} = X_{i,t+5} - X_{i,t+2}$ is a vector representing changes in time-varying covariates for graduate i between years t+2 and t+5; $\Delta\beta_{t+5} = \beta_{t+5} - \beta_{t+2}$ is a vector of coefficient differences between years 2 and 5 for the individual- and time-varying covariates; $\Delta\gamma_{t+5} = \gamma_{t+5} - \gamma_{t+2}$ is a vector of coefficient differences between years t+2 and t+5 for the time-invariant and person-specific covariates; $\Delta\alpha_{t+5} = \alpha_{t+5} - \alpha_{t+2}$ is the difference in unobserved year-specific fixed effects for years t+2 and t+5 (which is a constant for each graduate cohort but varies across graduate cohorts); and $u_{i,t+5} = \varepsilon_{i,t+5} - \varepsilon_{i,t+2}$ is an unobservable individual- and time-varying random error. Equation (4) relates the three-year earnings growth rate for graduate i to three sets of observed worker and job characteristics: (1) the vector X_i of individual-specific and time-invariant baseline characteristics; (2) the vector $X_{i,t+2}$ of individual- and time-varying characteristics for year t+2 (the year of the initial interview); and (3) the vector $\Delta X_{i,t+5}$ of differences in individual and time-varying characteristics between the second and fifth post-graduation years. The log-earnings growth equations (3) and (4) are of course formally equivalent; they are simply alternative wages of estimating and presenting the coefficient estimates of the earnings growth equation.

Earnings growth equations (3) and (4) indicate that the three-year log-earnings growth of recent graduates is in general related to graduates' time-invariant baseline characteristics (the vector X_i) and to the current characteristics of graduates and their jobs in post-graduation years 2 and 5 (the vectors $X_{i,t+2}$ and $X_{i,t+5}$). Separate coefficient estimates of these earnings growth equations for male and female graduates in each NGS cohort are estimated; these permit empirical testing of numerous interesting hypotheses. The empirical relevance of recent graduates' measured baseline characteristics (the X_i regressors) in accounting for post-graduation earnings growth can be investigated by testing whether some or all of the coefficients in the vector $\Delta\gamma_{t+5} = \gamma_{t+5} - \gamma_{t+2}$ are equal to zero for men or women and assessing the magnitudes of the relevant coefficient estimates. Similarly, whether the effects of graduates' observed current characteristics two years after graduation (the $X_{i,t+2}$ regressors) have discernible effects on post-graduation earnings growth can be assessed by inspecting estimates of the coefficient vector $\Delta\beta_{t+5} = \beta_{t+5} - \beta_{t+2}$ in equation (4). Finally, the extent to which changes in graduates' current worker and job characteristics (the $\Delta X_{i,t+5}$ regressors) influence earnings growth is revealed by estimates of the β_{t+5} coefficients.

3. Sample Data and Variable Definitions

This section outlines the construction of the estimation samples for the three NGS graduate cohorts of 1982, 1986 and 1990, and explains the operational specification of the regressors included in the three-year log-earnings growth equations.

The National Graduates Surveys

The National Graduates Surveys (NGS), sponsored by Human Resources Development Canada and conducted by Statistics Canada, are specifically designed to obtain information on the relationship between education/training and labour market activities, the long-term labour market experiences of graduates, the employment, earnings, occupation and additional educational experiences and qualifications of graduates. The NGS focuses on individuals who had obtained a degree, diploma or certificate from a trade/vocational school, a career/technical college (or CEGEP) or a university, and who were still living in Canada at the time of the survey. The NGS files are representative of the underlying graduate population in Canada.

Background

Statistics Canada conducted a first survey in 1978 on the labour market experiences of 1976 graduates from universities and community colleges in Canada. In 1984, a similar survey, the NGS of 1982 graduates was sponsored jointly by the Department of the Secretary of State and Employment and Immigration Canada and conducted by Statistics Canada. This survey expanded on the content of the previous survey and extended the population base to include graduates of trade/vocational programs in addition to graduates from community colleges and universities.

Since 1982, four cohorts of graduates have been surveyed. Every cohort was interviewed two and five years after graduation.

Year of graduation	First interview	Follow-up interview
1982	1984	1987
1986	1988	1991
1990	1992	1995
1995	1997	2000

The 2000 Follow-up Survey of the 1995 Graduates included a 'brain drain' component. Those who graduated in 1995 but who were living in the United States in June 2000 were included in the survey.

Objectives

The survey's key data objectives are:

- To obtain information for labour market analysis;
- To obtain information on the relationship between education/training and labour market experiences and the exposure of graduates to additional learning opportunities;
- To extend available information required to improve occupational supply and demand projection models and to conduct related studies of supply-demand imbalances in the labour market;
- To extend available information required to improve occupational supply and demand projection models and to conduct related studies of supply-demand imbalances in the labour market;

- To obtain data regarding longer-term market experiences of graduates;
- To obtain information on labour market experiences of members of target groups (such as women, visible minorities, native people, and persons with disabilities);
- To gain a better understanding of school-work transitions and returns to human capital;
- To gain a better understanding of post-secondary education financing;
- To obtain more detailed information on knowledge and skills.

Methodology

The National Graduate Surveys were based on a stratified systematic random sample design. For each province, the graduate population was stratified into five education levels: trade/vocational (skilled trades), career/technical (college), undergraduate, master's level and doctorate. The levels were subsequently stratified into nine fields of study for those who had taken a college program and ten fields for trade/vocational and university graduates. These fields of study classifications were based on the 5-digit USIS (University Student Information System) and CCSIS (Community College Student Information System) codes used by Statistics Canada. The sample allocation to the strata was made to assure acceptable levels of detail and therefore acceptable data reliability for the provinces, education levels and fields of study.

A total sample was selected for every cohort of graduates. Interviewers attempted to contact all graduates in the sample, initially using the telephone numbers provided by their institution. On average for every cohort, 73% of the total sample selected were contacted and interviewed. The same individuals were contacted again for the follow-up interview.

Year of graduation	Total sample selected	Year of survey	Usable sample (response rate)
1982	49,150	1984	35,717 (73%)
		1987	31,167
1986	53,136	1988	40,814 (77%)
		1991	35,401
1990	51,111	1992	36,280 (71%)
		1995	35,816
1995	61,759	1997	43,040 (70%)
		2000	To be completed

For more detailed information on methodology, see:

Clark, Warren, Margaret Laing and Edith Rechnitzer (1986). *The Class of 82: Summary Report on the Findings of the 1984 National Survey of the Graduates of 1982,* Secretary of State and Statistics Canada.

Clark, Warren (1991). *The Class of 1986: A Compendium of Findings of the 1988 National Graduates Survey of 1986 Graduates with Comparisons to the 1984 National Graduates Survey*, Employment and Immigration Canada and Statistics Canada, Catalogue LM-198E92.

Little, Don and Louise Lapierre (1996). *The Class of 90: A Compendium of Findings from the 1992 National Graduates Survey of 1990 Graduates,* Human Resources Development Canada and Statistics Canada, Catalogue SC-125-12-96E.

Taillon, Jacques and Mike Paju (1999). *The Class of '95: Report of the 1997 National Survey of 1995 Graduates*, Human Resources Development Canada and Statistics Canada, Catalogue SP-121-04-99.

3.1 Construction of the NGS Estimation Samples

In constructing the three estimation samples for the NGS graduate cohorts of 1982, 1986 and 1990, our sample is primarily limited by the focus on earnings change. Within each cohort, the sample is necessarily limited to graduates who where employed and reported valid earnings both two years and five years following graduation. Further sample restrictions adhere quite closely to the sample inclusion/exclusion criteria employed in previous studies based on the NGS by Finnie (forthcoming, 2000) and Finnie and Wannell (forthcoming, 1999). These studies identified what might be termed "greenfield" entrants to the labour market: graduates whose main store of human capital is in their bachelors degree, who found work soon after graduation and have apparently remained committed to the labour market in subsequent years. This outlook results in the following, additional sample restrictions.

First, the entire analysis excludes graduates who had previously accumulated five or more years of full-time work experience, as well as those 35 years of age or older, by the time of graduation. This results in a sample with a fairly "clean" school-to-work transition. These deletions would exclude, for example, women returning to school after having spent time raising children or men and women who have made mid-career switches involving major re-tooling in terms of education. While such individuals certainly comprise interesting groups of graduates, their study is best left to a separate project.

Second, graduates who attained an additional degree by one of the two interview dates were deleted from the analysis. This avoids a confusing (and degree-of-freedom robbing) array of field of study and degree level combinations that would be necessary to follow the paths of multiple degree holders. A second, related reason for this selection rule is that including "additional degree graduates" would have thrown off the precise post-graduation time frame corresponding to the two interview dates (*i.e.*, two and five years after graduation) which holds for the non-continuing group. Finally, it is impossible to identify the specific field of study in which any new degree was obtained as of the 1984 survey for the 1982 graduates.

Third, part-time workers who cited school as the reason for their partial involvement in the labour market were excluded. Such individuals were – by definition – still principally students

and had therefore not yet entered the school-to-work transition phase of their careers in earnest.[3] Other part-time workers were, on the other hand, generally included in the analysis, thus lending it a broad sample base.

Fourth, the small number (less than one-half of one percent in each year) of "other" workers (*i.e.*, not paid, not self-employed) were also eliminated from the sample. This group consists of unpaid family workers, volunteers, and other non-standard workers whose earnings patterns are well outside the mainstream of their fellow graduates. A similarly small number of workers deemed to have unreasonably low earnings were also deleted.[4]

Finally, observations were dropped if missing values were encountered for any of the independent variables.[5] These restrictions resulted in samples for all three graduate cohorts that are very similar in size. The 1982 estimation sample consists of a total of 3,467 observations, of which 1,820 (52.5 percent) and males and 1,647 (47.5 percent) are females. The 1986 estimation sample contains a total of 3,453 observations, of which 1,717 (49.7 percent) and males and 1,736 (50.3 percent) are females. And the 1990 estimation sample contains 3,517 observations, of which 1,741 (49.5 percent) are males and 1,776 (50.5 percent) are females. In addition to their similar size, the three estimation samples are also similar in gender composition, although the sample proportion of females tends to increase slightly between the 1982 and 1990 graduate cohorts.

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3 An analysis of the 1982 cohort, for which enrolment status as of the interview dates is given in the NGS files (which was not the case for the later cohorts), revealed that most individuals eliminated by this restriction (part-time – student) were in fact full-time students and, conversely, that most full-time students were eliminated by this condition, precisely as wished.

4 Full-time workers with less than $5,000 in annual earnings (the equivalent of a wage of about $3.20 per hour for 30 hours of work per week over 52 weeks) were deleted. This affected no more than approximately one-half of 1 percent of the sample in each year, with a relatively high proportion of the first interview cases (where there were generally more such low earners) being individuals who then obtained a new diploma by the subsequent interview (who were otherwise eliminated from most of the analysis – see above), suggesting the relevant jobs were research assistantships or other such atypical jobs.

5 The sole exception was the temporary/permanent variable. There was a very high incidence of "unknown" for this variable, perhaps because some respondents were in a probationary period or were unsure of their own intentions in relations to the job. To preserve the sample size, an identification variable for these individual was included in the models.

3.2 Variable Definitions

The outcome variables of central interest in this study are the earnings levels of recent male and female graduates in the second and fifth post-graduation years. The earnings measure available in the NGS is the annualized earnings rate of each employed respondent, as distinct from actual or realized annual earnings. The annualized earnings rate is a respondent's estimate of what he or she would earn if the job held at the time of the interview were to last for a full year.[6] That is, annualized earnings measures an individual's rate of pay on an annual basis regardless of the full-year/part-year status of the job and the individual's current tenure in the job; it can be thought of as a respondent's full-year equivalent wage rate. The sample values of annualized earnings for all six survey years are measured in constant 1995 dollars per year, rounded to the nearest thousand, and truncated at an upper limit of $99,000 in 1984 dollars, which equals $143,035 in constant 1995 dollars.[7] Post-graduation earnings growth is measured for members of each graduate cohort by the three-year log-earnings difference between the second and fifth post-graduation years, defined as the logarithm of the annual earnings rate in the job held at the time of the second interview (in year 5) minus the logarithm of the annual earnings rate in the job held at the time of the first interview (in year 2). Since this three-year log-earnings change is measured only for graduates who were employed at the time of both the first and second post-graduation interviews, our estimation samples include only individuals who were employed in both year 2 and year 5 following their graduation.

The earnings growth model outlined in Section 2 distinguishes between two categories of earnings covariates: those that are time-invariant (the vector X_i); and those that are time varying (the vectors $X_{i,t+2}$ and $X_{i,t+5}$). Definitions of all variables in both categories are given in Table A-1. The time-invariant covariates are person-specific and time-invariant variables representing the baseline characteristics of graduates in the year of graduation; they are immutable in the sense

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[6] For the 1982 NGS graduate cohort, each employed respondent's annualized earnings rate was obtained from responses to the question "If you were to work at that job for 12 months, what would be your gross annual earnings?" For 1986 graduates, the question was "If you were to work your usual hours at that job for 12 months, approximately what would be your gross earnings?" And for 1990 graduates, the question was "Working your usual hours, approximately what would be your annual earnings before taxes and deductions at that job?"

[7] The 1984 survey of 1982 graduates had the lowest upper limit on coded annualized earnings values of the six NGS surveys used in this study. Although later surveys had higher upper limits, we opted to use a uniform upper bound so as not to distort comparisons of earnings levels across survey years. Only very small fractions of graduates in our estimation samples had earnings coded at the upper bound.

that their values do not change after graduation. The baseline characteristics we use as predictors of earnings growth include: age in year of graduation; major field of study or specialization; whether the degree program completed was a coop program; language first spoken (mother tongue); father's education; and mother's education. The last three baseline characteristics (language first spoken, father's education, and mother's education) are included to capture the earnings effects of parental family background. Major field of study is coded into 15 discipline categories; these are listed in Table A-1.

The second category of earnings covariates consists of time-varying variables, which we refer to as current characteristics. These are person-specific and time-varying variables that measure individual graduate's current demographic, locational and job characteristics. The current worker and job characteristics we use in our empirical analysis are fairly standard in empirical earnings functions. They include class of worker in current job (paid worker or self-employed); full-time/part-time status in current job (or usual weekly hours, available only for the 1986 and 1990 NGS cohorts); whether the current job is permanent or temporary; region (province) of residence; marital status; number of dependent children; occupation in current job; and industry of current job.

The manner in which graduates' baseline characteristics are entered as regressors in the earnings growth equations is straightforward. Since all baseline characteristics apart from age are categorical variables, they are represented in the earnings growth equations by one or more indicator variables. The age effect on earnings growth is specified to be quadratic, meaning that both age and age-squared are entered as regressors.

In contrast to the case for the time-invariant baseline characteristics, there are alternative ways of specifying the effects on earnings growth of graduates' time-varying current characteristics when these characteristics are measured as categorical variables. These alternatives can be illustrated using region of residence as an example. In our empirical analyses, region of residence in year 2 or year 5 is represented by a set of six indicator variables identifying the Atlantic Provinces, Quebec, Ontario (the reference group), Manitoba/Saskatchewan, Alberta, and British Columbia. One way of specifying the earnings growth effects of region is simply to include as regressors two sets of five region indicator variables, one representing region of residence in year 2 and the

other representing region of residence in year 5. A limitation of this specification is that it does not explicitly capture the earnings growth effects of transitions or changes in region of residence between the two years. For example, the sum of the coefficient estimates for the indicator of Quebec residence in year 2 and the indicator of Quebec residence in year 5 is not an estimate of the marginal effect on earnings growth of being a resident of Quebec in both year 2 and year 5. The reason is that the indicator variable for Quebec residence in year 2 identifies all graduates who lived in Quebec in year 2, both those who were living in Quebec in year 5 and those who were living elsewhere in year 5. Consequently, the sum of the coefficient estimates for Quebec residence in year 2 and Quebec residence in year 5 cannot be interpreted as the earnings growth effect of being a resident of Quebec in *both* years 2 and 5. One way of avoiding this limitation is to define indicator variables for all possible transitions between region of residence in year 2 and region of residence in year 5. Given our six-group coding of region, there are a total of 36 possible transitions between region of residence in year 2 and region of residence in year 5. As a result, one would have to include as regressors a total of 35 indicator variables for individual region transitions in order to control for the effects on earnings growth of all possible transitions in region of residence. Unfortunately, the size of our estimation samples makes this strategy infeasible. Moreover, the problems of controlling for all individual year 2 to year 5 transitions are correspondingly compounded for the 15-category occupation classification and the 13-category industry classification. Although further aggregation of the occupation and industry categories would mitigate these problems, the occupation and industry categories are already highly aggregated.

In view of these considerations, we adopt a mixed strategy for modelling the earnings growth effects of time-varying categorical variables. First, for those categorical variables that have three or fewer categories in any given year, we include as regressors indicators for all but one of the individual transitions (the omitted indicator corresponds to the selected base group or reference group). This is the specification adopted for class of worker, full-time/part-time status, temporary/permanent job status, marital status and the number of children. Second, for those categorical variables that distinguish four or more groups, we employ a different strategy. Using the categorical variable region of residence to illustrate, we define two sets of region indicator variables. One set consists of six indicator variables identifying those graduates who resided in each of the six regions in both year 2 and year 5; the other set consists of six indicator variables

identifying those graduates who lived in each of the six regions in year 5 but who were not living in that same region in year 2. For example, the indicator variable labelled "Ontario both years" equals one for all graduates who were living in Ontario in both year 2 and year 5. The indicator variable labelled "To Ontario" identifies all graduates who were living in Ontario in year 5 but who were living elsewhere in year 2.[8] Analogous pairs of indicator variables are defined for the remaining five regions, giving a total of 12 region indicator variables. The effects of region of residence on earnings growth are then modelled by including any 11 of the 12 region indicator variables as regressors in an earnings growth equation. The same strategy is used to model the earnings growth effects of occupation and industry.

The last hypothesized predictor of earnings and earnings growth that requires explanation is usual weekly hours of work. The dichotomous distinction between part-time jobs (defined as those for which usual hours of work per week is less than 30) and full-time jobs (defined as those for which usual hours of work per week is greater than or equal to 30) represents a rather blunt way of allowing for hours of work effects on earnings levels and earnings growth. Within the categories of part-time jobs and full-time jobs, there is obviously considerable scope for substantial variation among workers in the number of hours they usually work per week. Moreover, there are reasons to think that hours of work may have a positive effect on graduates' earnings growth. First, the rate of on-the-job human capital accumulation may be positively related to how much individuals work. Second, longer hours of work may be interpreted by employers as signals of higher worker productivity and greater worker effort, thereby increasing the probability of promotion with its attendant increases in pay. In either case, one would expect usual weekly hours of work to have a positive effect on graduates' earnings growth in the initial years of their post-schooling working lifetimes.

Unfortunately, data on graduates' usual weekly hours is available only for the 1986 and 1990 NGS graduate cohorts; it was not collected for the 1982 NGS cohort. Since usual weekly hours is measured in the NGS source files as a continuous variable, it can be included in an earnings or

[8] This specification of changes in region of residence between the second and fifth post-graduation years constrains the earnings growth effect of moving to a particular region to be the same for all origin regions from which the move could be made. For example, the "To Ontario" indicator variable constrains the earnings growth effect of moving to Ontario to be the same regardless of whether the move to Ontario was made from the Atlantic Provinces, Quebec, Manitoba/ Saskatchewan, Alberta or British Columbia.

earnings growth equation as either a continuous or a categorical variable. Categorical representation of usual weekly hours with a set of indicator variables corresponding to selected hours intervals is attractive because it is form free; that is, it imposes no functional form restrictions on the effect of usual weekly hours on earnings or earnings growth and thereby allows for both non-linear and threshold effects. Nevertheless, we have opted to include usual weekly hours as a continuous variable in our earnings growth equations primarily because it permits a much more parsimonious representation of the earnings growth effects of hours and changes in hours. If we measure hours categorically by distinguishing eight hours intervals, we would need a total of 63 regressors to represent the effects on earnings growth of all individual transitions in hours between year 2 and year 5 following graduation. Alternatively, we can provide a much more compact specification of hours effects by measuring usual weekly hours as a continuous variable. Let H_{t+2} denote usual weekly hours of a graduate in year 2, and $\Delta H_{t+5} = H_{t+5} - H_{t+2}$ the change in usual weekly hours between year 2 and year 5. To allow for non-linear effects in both levels and changes in usual weekly hours, we include as regressors in some earnings growth equations for 1986 and 1990 graduates the variables H_{t+2}, H_{t+2}-squared, H_{t+2}-cubed, ΔH_{t+5}, and $H_{t+2}\Delta H_{t+5}$. This specification is quite flexible: the marginal effect on earnings growth of year 2 hours (H_{t+2}) is quadratic in hours levels and linear in hours changes, while the marginal earnings growth effect of changes in hours (ΔH_{t+5}) is linear in hours levels. The usual weekly hours regressors are included in place of the full-time/part-time indicator variables in selected earnings growth equations for 1986 and 1990 graduates. The log-earnings growth equations that include regressors representing year 2-to-year 5 transitions in full-time/part-time status are referred to as model 1; the log-earnings growth equations that include regressors for the level and change in usual weekly hours are referred to as model 2.

4. Male and Female Earnings Growth

Table 1 displays the weighted sample means of the three-year log-earnings growth rates of male and female graduates in our estimation samples of 1982, 1986 and 1990 Bachelor's level university graduates; the weights are the NGS sampling weights for each sample member in the fifth post-graduation year. The three-year log-earnings growth rates are calculated for each sample observation as the difference between the logarithm of the annualized earnings rate for the job held in the fifth post-graduation year ($\ln E_{t+5}$) and the logarithm of the annualized earnings rate for the job held in the second post-graduation year ($\ln E_{t+2}$); the three-year log-earnings growth rate for each sample member is thus $\Delta \ln E = \ln E_{t+5} - \ln E_{t+2}$.

Table 1: **Sample Means of Three-Year Log-Earnings Growth Rates, Male and Female Bachelor's Graduates, 1982, 1986 and 1990**

Year of graduation	*Mean Log-Earnings Growth Rates*		
	Males	Females	Male-Female Difference
1982	.2679 (26.63)	.1922 (12.55)	.0757 (4.134)
1986	.2250 (20.33)	.2070 (15.26)	.01794 (1.025)
1990	.2226 (16.79)	.1756 (12.54)	.04703 (2.439)

Notes: Log-earnings growth rates are computed as the difference between the logarithm of annualized earnings for the job held in the fifth post-graduation year and the logarithm of annualized earnings for the job held in the second post-graduation year. The second and fifth post-graduation years are 1984 and 1987 for the 1982 graduate cohort, 1988 and 1991 for the 1986 graduate cohort, and 1992 and 1995 for the 1990 graduate cohort. The figures in parentheses are regression estimated t-statistics computed from weighted OLS estimation of log-earnings growth equations that include only a constant and a male (or female) indicator variable; the weights are the sampling weights for the fifth post-graduation year.

Table 1 indicates that the mean log-earnings growth rate of male graduates exceeded the mean log-earnings growth rate of female graduates in all three of our estimation samples. However, the male-female difference in mean log-earnings growth rates is statistically significant at conventional test levels only for the 1982 and 1990 estimation samples of graduates; for the 1986 estimation sample, it is positive, numerically small, and statistically insignificant.

5. Empirical Findings

This section summarizes our empirical findings respecting male and female graduates' three-year log-earnings growth rates. These findings are derived from estimates of log-earnings growth equations for male and female graduates that include as regressors variables representing several baseline and current characteristics of graduates and their jobs. The coefficient estimates from these earnings growth equations represent either the "adjusted" mean differences in graduates' earnings growth rates associated with categorically measured variables, or the partial effects on earnings growth rates of unit changes in continuously measured variables, in the presence of controls for other conditioning variables. Our investigation is exploratory in nature, and is intended to identify which of the baseline and current characteristics of graduates and their jobs are associated with differences in post-graduation earnings growth between the second and fifth post-graduation years.

Two alternative empirical models of earnings growth are estimated; they differ in their specification of hours of work effects on earnings growth. Model 1 includes controls for full-time/part-time status, and is estimated for all three graduate cohorts. Model 2 replaces the full-time/part-time indicators with regressors measuring graduates' usual weekly hours of work in year 2 and the change in usual weekly hours between year 2 and year 5; it is estimated only for the 1986 and 1990 NGS cohorts, since data on usual weekly hours was not collected for the 1982 NGS cohort. In addition, two variants of each model are estimated: variant A excludes controls for occupation and industry transitions between year 2 and year 5, whereas variant B includes them. The purpose of estimating these two variants of each earnings growth model is twofold: first, to provide some evidence on the robustness of the estimated earnings growth effects of other observed covariates, particularly field of study, to the specification and choice of conditioning variables; and second, to obtain evidence on whether and how transitions in occupation and industry of employment between the second and fifth post-graduation years are related to graduates' three-year log-earnings growth rates.

Tables 2-1 and 2-2 provide an overview of our empirical results respecting the observed determinants of post-graduation earnings growth; they display the results of joint F-tests of coefficient exclusion restrictions for each of the hypothesized determinants of post-graduation

earnings growth for male and female graduates in the three NGS graduate cohorts. In particular, Table 2-1 contains the p-values for F tests performed on estimates of models 1A and 1B, which

Table 2-1: **Joint F-tests of Coefficient Exclusion Restrictions on Log-Earnings Growth Equations: Model 1**
Male and Female Bachelor's Graduates, 1982, 1986 and 1990

	Female Graduates			*Males Graduates*		
Explanatory Variable	1982	1986	1990	1982	1986	1990
Model 1A: All variables except Occupation and Industry						
Time-Invariant Baseline Characteristics						
Field of Study (14)	.0006	.0030	.0028	.0000	.0003	.0000
Coop program (1)	.3826	.5811	.7620	.4981	.3574	.7654
Age (2)	.0009	.6392	.5775	.5860	.0001	.0921
Language first spoken (2)	.0338	.3965	.9295	.5150	.8739	.0923
Father's education (4)	.0991	.4132	.2578	.9568	.1977	.3087
Mother's education (4)	.5227	.0759	.3404	.6660	.9059	.4789
All time-invariant regressors	.0001	.0006	.0012	.0000	.0000	.0000
Time-Varying Current Characteristics						
Class of worker (3)	.7513	.0000	.1031	.0433	.0614	.0693
Full-time/Part-time job (3)	.0000	.0000	.0000	.0056	.0000	.0000
Temporary/permanent job(4)	.1246	.0000	.0001	.0146	.2404	.4129
Region of residence (11)	.0637	.0000	.7190	.0077	.0308	.1647
Marital Status (6)	.0748	.0773	.1274	.4586	.4228	.0122
Number of children (3)	.2109	.1068	.1210	.9145	.2590	.2265
Model 1B: All variables including Occupation and Industry						
Time-Invariant Baseline Characteristics						
Field of study (14)	.1627	.0633	.1211	.3222	.2058	.0000
Coop program (1)	.5790	.8296	.5275	.4042	.1980	.5158
Age (2)	.0014	.7489	.6655	.8541	.0000	.0862
Language first spoken (2)	.0209	.5354	.7715	.6289	.4210	.1328
Father's education (4)	.0348	.2470	.1363	.9876	.0717	.3865
Mother's education (4)	.7915	.0183	.2427	.4598	.8819	.2883
All time-invariant regressors	.0204	.0307	.1111	.5521	.0034	.0000
Time-Varying Current Characteristics						
Class of worker (3)	.8320	.0059	.1125	.0380	.0466	.0806
Full-time/Part-time job (3)	.0000	.0000	.0000	.0047	.0000	.0000
Temporary/permanent job(4)	.0469	.0003	.0001	.0058	.0671	.1403
Region of residence (11)	.2335	.0015	.4380	.0467	.0244	.1718
Marital status (6)	.0581	.0906	.0404	.6268	.2844	.0002
Number of children (3)	.2920	.0266	.2208	.8842	.3706	.1720
Occupation (29)	.0704	.0007	.0006	.0487	.0000	.0273
Industry (25)	.1908	.0224	.0001	.0002	.0016	.0001

Notes: The figures in the table are p-values for F-tests of the null hypothesis that the regression coefficients for each explanatory variable are jointly equal to zero in the log-earnings growth equation. The figures in parentheses in the first column are the number of coefficients corresponding to each explanatory variable, and hence the number of coefficient exclusion restrictions specified by the null hypothesis.

Table 2-2: **Joint F-tests of Coefficient Exclusion Restrictions on Log-Earnings Growth Equations: Model 2**
Male and Female Bachelor's Graduates, 1986 and 1990

	Female Graduates		*Male Graduates*	
Explanatory Variable	1986	1990	1986	1990
Model 2A: All variables except Occupation and Industry				
Time-Invariant Baseline Characteristics				
Field of study (14)	.0072	.0004	.0008	.0002
Coop program (1)	.7682	.4037	.3805	.8976
Age (2)	.4535	.1059	.0007	.3154
Language first spoken (2)	.6166	.6499	.9448	.2086
Father's education (4)	.5087	.3352	.1267	.1485
Mother's education (4)	.1310	.5442	.8945	.3497
All time-invariant regressors (27)	.0008	.0010	.0005	.0000
Time-Varying Current Characteristics				
Class of worker (3)	.0000	.0350	.0404	.2433
Usual weekly hours (5)	.0000	.0000	.0000	.0000
Temporary/Permanent job (4)	.0000	.0079	.0449	.3462
Region of residence (11)	.0001	.6555	.0258	.1749
Marital status (6)	.1203	.1598	.4415	.0003
Number of children (3)	.0120	.2387	.4259	.1406
All time-varying regressors (32)				
Model 2B: All variables including Occupation and Industry				
Time-Invariant Baseline Characteristics				
Field of study (14)	.0433	.0339	.2528	.0003
Coop program (1)	.8871	.8816	.3551	.4644
Age (2)	.4982	.1089	.0001	.2090
Language first spoken (2)	.8301	.9218	.5442	.2407
Father's education (4)	.3820	.0768	.0200	.1903
Mother's education (4)	.0464	.2458	.8350	.1435
All time-invariant regressors (27)	.0282	.0462	.0054	.0001
Time-Varying Current Characteristics				
Class of worker (3)	.0009	.0304	.0204	.1938
Usual weekly hours (5)	.0000	.0000	.0000	.0000
Temporary/Permanent job (4)	.0031	.0025	.0176	.1451
Region of residence (11)	.0000	.7463	.0280	.1693
Marital status (6)	.1341	.0006	.4023	.0000
Number of children (3)	.0005	.4509	.3728	.0970
Occupation (29)	.0029	.0002	.0002	.1480
Industry (25)	.0007	.0002	.0052	.0002
All time-varying regressors (84)				

Notes: The figures in the table are p-values for F-tests of the null hypothesis that the regression coefficients for each explanatory variable are jointly equal to zero in the log-earnings growth equation. The figures in parentheses in the first column are the number of coefficients corresponding to each explanatory variable, and hence the number of coefficient exclusion restrictions specified by the null hypothesis.

include transitions in full-time/part-time status; Table 2.2 tabulates the corresponding p-values obtained for models 2A and 2B, which incorporate regressors representing usual weekly hours of work. Tables containing the full set of male and female coefficient estimates for all estimated log-earnings growth equations are relegated to Appendix B.

5.1 Findings for Field of Study

A major objective of the current research is to investigate the empirical relevance of Bachelor's graduates' field of study in accounting for differences in their post-graduation earnings growth. The central question of interest is whether field of study is associated with discernible differences in post-graduation earnings growth. As will become clear, our evidence on this question differs depending on whether or not controls for occupation and industry are included in the estimated log-earnings growth equations.

In the absence of controls for occupation and industry, the coefficient estimates for models 1A and 2A are consistent with the existence of adjusted mean differences in post-graduation earnings growth by graduates' major field of study. For both males and females in all three NGS cohorts, the regression-adjusted differences in earnings growth by field of study are statistically jointly significant at the 1 percent test level. Tables 3-1 to 3-3 tabulate both the unadjusted sample means of the log-earnings growth rates for all 15 field of study categories and the corresponding regression-adjusted log-earnings growth rates for our six estimation samples of male and female graduates in the 1982, 1986 and 1990 NGS cohorts. The regression-adjusted log-earnings growth rates are those implied by the coefficient estimates of model 1A, the earnings growth equation that controls for full-time/part-time status but does not control for occupation and industry; they are calculated on the assumption that age in year of graduation equals 24 and that the graduate otherwise conforms to the reference group characteristics for all other covariates of earnings growth. The unadjusted log-earnings growth rates are computed by estimating log-earnings change equations in which the only regressors are indicator variables for the fields of study.

With respect to their levels across successive graduate cohorts, log-earnings growth rates by field of study, both unadjusted and adjusted, remained relatively stable for female graduates, but decreased for male graduates between the 1982 and 1990 cohorts. For female graduates, the

average of the regression-adjusted log-earnings growth rates for the 15 fields of study equalled 0.2011 for the 1982 cohort, 0.2182 for the 1986 graduate cohort, and 0.2060 for the 1990 cohort. For male graduates, in contrast, the average of the regression-adjusted log-earnings growth rates for the 15 fields of study decreased from 0.2465 for the 1982 cohort to 0.2067 for the 1986 cohort and to 0.1585 for the 1990 cohort. As a result, the male-female difference in average

Table 3-1: **Unadjusted and Adjusted Mean Log-Earnings Growth by Field of Study**
1982 Male and Female Graduates

Field of Study	*Males*		*Females*	
	Unadjusted	Adjusted	Unadjusted	Adjusted
No field of specialization	.1734	.1520	.3939	.2115
	(5.987)	(3.691)	(2.672)	(2.837)
Elementary/secondary teaching	.1496	.1226	.1535	.1690
	(4.777)	(2.651)	(4.656)	(3.998)
Other education	.2562	.2332	.1581	.1475
	(5.951)	(4.899)	(2.774)	(2.257)
Fine arts and humanities	.2910	.2628	.2015	.1568
	(6.262)	(5.360)	(3.160)	(2.315)
Commerce	.3078	.3048	.2563	.2527
	(16.09)	(9.227)	(9.254)	(5.262)
Economics	.3627	.3576	.1671	.1051
	(6.023)	(5.467)	(2.880)	(1.420)
Law	.4649	.4842	.3312	.3619
	(4.954)	(5.947)	(5.513)	(4.264)
Social Sciences (except Economics)	.2701	.2468	.2171	.2087
	(10.80)	(6.836)	(7.411)	(4.307)
Agricultural and biological sciences	.2217	.1931	.2437	.2271
	(4.709)	(3.544)	(4.897)	(4.146)
Veterinary sciences	.1788	.2169	.03256	.08558
	(1.355)	(1.690)	(0.250)	(0.767)
Engineering	.2092	.2069	.1534	.1966
	(16.99)	(7.439)	(2.822)	(2.935)
Medical professions (doctors, etc.)	.3798	.3319	.4679	.4490
	(5.790)	(4.387)	(5.132)	(4.058)
Other health professions (nurses, etc.)	.1865	.1469	.07599	.1047
	(3.136)	(2.246)	(2.735)	(2.404)
Computer sciences	.2049	.2103	.2086	.1729
	(9.794)	(6.416)	(5.546)	(3.122)
Mathematical and physical sciences	.2438	.2282	.2066	.1681
	(8.038)	(6.103)	(5.938)	(3.739)
F-statistic	3.75	3.99	3.21	2.70
(p-value)	(0.0000)	(0.0000)	(0.0000)	(0.0006)
Number of observations	1,820	1,820	1,647	1,647

Notes: The adjusted estimates of mean log-earnings growth rates are those implied by the coefficient estimates of model 1A (which includes indicator variables for full-time/part-time status and excludes controls for occupation and industry) and are computed for a graduate who was 24 years of age in the year of graduation and who otherwise has the reference group characteristics for all other measured covariates of earnings growth. The figures in parentheses are t-ratios. The F-statistics test the null hypothesis that mean log-earnings growth rates are equal across the 15 fields of study.

Table 3-2: **Unadjusted and Adjusted Mean Log-Earnings Growth by Field of Study**
1986 Male and Female Graduates

Field of Study	*Males*		*Females*	
	Unadjusted	Adjusted	Unadjusted	Adjusted
No field of specialization	.2171	.2096	.2437	.2603
	(2.911)	(3.092)	(3.428)	(4.851)
Elementary/secondary teaching	.1198	.1149	.1677	.1718
	(5.000)	(2.871)	(4.529)	(3.752)
Other education	.1738	.1434	.2392	.1707
	(3.925)	(2.973)	(4.122)	(2.663)
Fine arts and humanities	.1563	.1279	.1848	.1677
	(3.681)	(2.714)	(3.485)	(3.783)
Commerce	.2218	.2242	.2443	.2477
	(8.714)	(6.089)	(9.752)	(6.168)
Economics	.2218	.1875	.2468	.1310
	(3.565)	(3.004)	(2.140)	(1.437)
Law	.3850	.3808	.3155	.3294
	(8.650)	(6.806)	(5.816)	(4.260)
Social Sciences (except Economics)	.3290	.2555	.2460	.2476
	(5.419)	(5.086)	(7.240)	(6.364)
Agricultural and biological sciences	.2687	.2259	.1944	.1939
	(7.232)	(5.582)	(3.932)	(3.649)
Veterinary sciences	.08436	.09440	.1964	.2118
	(1.179)	(1.047)	(2.014)	(2.379)
Engineering	.2071	.1967	.1934	.1709
	(11.04)	(6.374)	(2.860)	(2.643)
Medical professions (doctors, etc.)	.2425	.2543	.4010	.4204
	(2.683)	(2.538)	(6.659)	(5.045)
Other health professions (nurses, etc.)	.2827	.2295	.05458	.1324
	(3.049)	(3.135)	(1.901)	(3.297)
Computer sciences	.2487	.2706	.2521	.2606
	(8.798)	(5.964)	(5.643)	(4.479)
Mathematical and physical sciences	.2285	.1852	.1722	.1564
	(7.145)	(4.799)	(2.965)	(2.619)
F-statistic	3.16	2.85	3.51	2.36
(p-value)	(0.0001)	(0.0003)	(0.0000)	(0.0030)
Number of observations	1,717	1,717	1,736	1,736

Notes: The adjusted estimates of mean log-earnings growth rates are those implied by the coefficient estimates of model 1A (which includes indicator variables for full-time/part-time status and excludes controls for occupation and industry) and are computed for a graduate who was 24 years of age in the year of graduation and who otherwise has the reference group characteristics for all other measured covariates of earnings growth. The figures in parentheses are t-ratios. The F-statistics test the null hypothesis that mean log-earnings growth rates are equal across the 15 fields of study.

Table 3-3: **Unadjusted and Adjusted Mean Log-Earnings Growth by Field of Study**
1990 Male and Female Graduates

Field of Study	*Males*		*Females*	
	Unadjusted	Adjusted	Unadjusted	Adjusted
No field of specialization	.1599	.05653	.3857	.3137
	(6.448)	(1.175)	(4.731)	(3.345)
Elementary/secondary teaching	.1294	.1007	.08824	.09967
	(4.353)	(2.316)	(3.561)	(2.310)
Other education	.1962	.1267	.1784	.1826
	(4.936)	(2.421)	(3.759)	(3.102)
Fine arts and humanities	.3256	.2722	.2638	.2487
	(5.855)	(4.791)	(4.415)	(3.714)
Commerce	.2273	.1846	.1759	.1660
	(6.347)	(3.813)	(6.823)	(3.500)
Economics	.2528	.1667	.2881	.2124
	(3.919)	(2.541)	(2.441)	(1.628)
Law	.1793	.09784	.2175	.1993
	(2.311)	(1.050)	(2.178)	(2.274)
Social Sciences (except Economics)	.2541	.1649	.1851	.1776
	(4.783)	(2.530)	(4.712)	(4.117)
Agricultural and biological sciences	.2211	.1631	.2256	.2184
	(3.471)	(2.701)	(5.879)	(4.349)
Veterinary sciences	.2613	.2058	.1812	.2141
	(4.116)	(2.534)	(1.987)	(1.886)
Engineering	.1693	.1164	.1143	.1391
	(10.75)	(2.762)	(2.387)	(2.042)
Medical professions (doctors, etc.)	.4384	.3717	.3540	.4648
	(6.191)	(4.048)	(4.068)	(4.906)
Other health professions (nurses, etc.)	.07973	.02690	.02470	.1059
	(3.534)	(0.564)	(1.076)	(2.340)
Computer sciences	.1867	.1365	.1595	.1415
	(7.143)	(2.805)	(5.498)	(2.436)
Mathematical and physical sciences	.2403	.1867	.2362	.2066
	(9.323)	(4.725)	(5.733)	(3.928)
F-statistic	4.02	4.06	4.70	2.38
(p-value)	(0.0000)	(0.0000)	(0.0000)	(0.0028)
Number of observations	1,741	1,741	1,776	1,776

Notes: The adjusted estimates of mean log-earnings growth rates are those implied by the coefficient estimates of model 1A (which includes indicator variables for full-time/part-time status and excludes controls for occupation and industry) and are computed for a graduate who was 24 years of age in the year of graduation and who otherwise has the reference group characteristics for all other measured covariates of earnings growth. The figures in parentheses are t-ratios. The F-statistics test the null hypothesis that mean log-earnings growth rates are equal across the 15 fields of study.

regression-adjusted log-earnings growth rates for the 15 fields of study decreased from 0.0454 for the 1982 cohort to -0.0115 for the 1986 cohort and to -0.0475 for the 1990 cohort. The decline in the adjusted earnings growth rates of male graduates relative to female graduates is

also manifested by an increase across successive cohorts in the proportion of fields of study for which the adjusted log-earnings growth rate for females exceeds the adjusted log-earnings growth rate for males. Female graduates had higher regression-adjusted log-earnings growth rates than male graduates in 4 of the 15 fields of study for the 1982 cohort, in 7 of the 15 fields of study for the 1986 cohort, and in 12 of the 15 fields of study for the 1990 cohort. Thus, adjusted log-earnings growth rates by field of study apparently increased for female graduates relative to male graduates between the 1982 graduate cohort and the 1990 graduate cohort.

A potential difficulty that can arise in comparing the regression-adjusted earnings growth rates of male and female graduates in Tables 3-1 to 3-3 is that such comparisons may overstate or understate the earnings growth effects of field of study. The reason is that male-female differences in the levels of the regression-adjusted log-earnings growth rates reflect male-female differences in intercept coefficient estimates and age effects as well as male-female differences in the earnings growth effects of field of study. It is therefore more appropriate to use the estimates in Tables 3-1 to 3-3 to perform male-female comparisons of the ordinal rankings of fields of study on the basis of their estimated log-earnings growth rates. The purpose of such comparisons is to determine if the rankings of fields of study are similar or different for male and female graduates in a given NGS cohort. In addressing this question, we use the Spearman rank correlation coefficient as a descriptive summary measure of the degree of association between the male and female rankings. The closer to +1 (-1) is the value of the rank correlation coefficient, the more similar (dissimilar) are the male and female rankings of field of study according to their log-earnings growth rates. Values of the rank correlation coefficient in the neighbourhood of zero are indicative of little or no association or correlation, either positive or negative, between the male and female rankings of fields of study. The rank correlation coefficient for male and female rankings of fields of study by their regression-adjusted log-earnings growth rates equals 0.264 for the 1982 graduate cohort, 0.561 for the 1986 graduate cohort, and 0.521 for the 1990 graduate cohort.[9] For the 1986 and 1990 cohorts, there is a moderately strong positive association between the male and female rankings of fields of study: that is, fields of study for which the adjusted log-earnings growth rates have relatively high (low)

[9] The rank correlation coefficient for male and female rankings of fields of study according to their unadjusted mean log-earnings growth rates equals 0.486 for the 1982 graduate cohort, 0.386 for the 1986 graduate cohort, and 0.557 for the 1990 graduate cohort.

female ranks also tend to have relatively high (low) male ranks. The considerably smaller rank correlation coefficient for the 1982 graduate cohort indicates that the male and female rankings of fields of study by their adjusted log-earnings growth rates are only weakly correlated with one another. But for none of the three graduate cohorts is there strong and unambiguous evidence that fields of study with relatively high earnings growth rates for females also exhibit relatively high earnings growth rates for males.

Tables 3-1 to 3-3 also provide information pertaining to another interesting question: Which fields of study are associated with relatively high rates of earnings growth, and which are associated with relatively low rates of earnings growth? Table 4 lists the fields of study that had the highest and the lowest earnings growth rates, both unadjusted and adjusted, for male and female graduates in the three NGS cohorts.[10] It indicates a substantial degree of agreement between the unadjusted and adjusted log-earnings growth rates in classifying fields of study as either high earnings growth or low earnings growth. It also indicates that fields of study associated with high (low) earnings growth for male graduates were not necessarily associated with high (low) earnings growth for female graduates in the same cohort. Nonetheless, certain fields of study are consistently associated with high or low earnings growth for both male and female graduates. For both males and females, degrees in the medical professions (medicine, dentistry, etc.) and degrees in law are associated with relatively high earnings growth; degrees in elementary and secondary teaching and degrees in other health professions (nursing, etc.) are consistently associated with low earnings growth. However, there is also a good deal of turnover, or re-ordering, of the earnings growth rankings of fields of study across graduate cohorts. For 1986 male graduates, for example, degrees in fine arts and humanities ranked among the three lowest earnings growth fields, but for 1990 male graduates they ranked among the three highest earnings growth fields.

The introduction of controls for occupation and industry into the estimated earnings growth equations has important implications for the estimated effects of field of study. In the presence of controls for occupation and industry (models 1B and 2B), the estimated field of study effects on earnings growth are substantially attenuated in terms of their statistical significance. More specifically, when occupation and industry effects are included in model 1, the earnings growth

[10] The adjusted log-earnings growth rates are those implied by the coefficient estimates of model 1A.

effects of field of study are statistically jointly significant at the 1 percent level only for 1990 male graduates; for all three female graduate cohorts and the 1982 and 1986 male graduate cohorts, the hypothesis that the adjusted differences in mean log-earnings growth across fields of study are jointly zero cannot be rejected at the 5 percent significance level. For model 2, the introduction of controls for occupation and industry has somewhat less deleterious effects on the statistical precision of the estimated log-earnings growth differentials associated with field of study. Only for 1986 male graduates does model 2B yield coefficient estimates for field of study that are jointly insignificant at conventional test levels. The field of study coefficient estimates in model 2B are jointly significant at 5 percent for both 1986 and 1990 female graduates, while for 1990 male graduates they are jointly significant at the 1 percent test level. In the presence of controls for occupation and industry transitions, model 2 thus yields somewhat stronger evidence of adjusted earnings growth differentials by field of study than does model 1. However, this evidence remains appreciably weaker statistically than that obtained in the absence of controls for occupation and industry. In other words, for both models 1 and 2, our evidence that adjusted earnings growth differentials are associated with graduates' field of study is considerably stronger when occupation and industry are excluded from the earnings growth equations than when they are included.

Table 4: **Fields of Study with Highest and Lowest Mean Log-Earnings Growth Rates**
Male and Female Graduates of 1982, 1986 and 1990

Gender	*Cohort*	*Adjusted or Unadjusted*	*Fields of Study with Highest Earnings Growth*	*Fields of Study with Lowest Earnings Growth*
1982 Cohort				
Male	1982	Unadjusted	Law Medical Professions Economics	Elementary/Secondary Teaching No Specialization Veterinary Sciences
Male	1982	Adjusted	Law Economics Medical Professions	Elementary/Secondary Teaching Other Health Professions No Specialization
Female	1982	Unadjusted	Medical Professions No Specialization Law	Veterinary Sciences Other Health Professions Engineering
Female	1982	Adjusted	Medical Professions Law Commerce	Veterinary Sciences Other Health Professions Economics

(continued)

Table 4 (continued)

Gender	*Cohort*	*Adjusted or Unadjusted*	*Fields of Study with Highest Earnings Growth*	*Fields of Study with Lowest Earnings Growth*
1986 Cohort				
Male	1986	Unadjusted	Law Social Sciences Other Health Professions	Veterinary Sciences Elementary/Secondary Teaching Fine Arts & Humanities
Male	1986	Adjusted	Law Computer Sciences Social Sciences	Veterinary Sciences Elementary/Secondary Teaching Fine Arts & Humanities
Female	1986	Unadjusted	Medical Professions Law Computer Sciences	Other Health Professions Elementary/Secondary Teaching Mathematics/Physical Sciences
Female	1986	Adjusted	Medical Professions Law Computer Sciences	Economics Other Health Professions Mathematics/Physical Sciences
1990 Cohort				
Male	1990	Unadjusted	Medical Professions Fine Arts & Humanities Veterinary Sciences	Other Health Professions Elementary/Secondary Teaching No Specialization
Male	1990	Adjusted	Medical Professions Fine Arts & Humanities Veterinary Sciences	Other Health Professions No Specialization Law
Female	1990	Unadjusted	No Specialization Medical Professions Economics	Other Health Professions Elementary/Secondary Teaching Engineering
Female	1990	Adjusted	Medical Professions No Specialization Fine Arts and Humanities	Elementary/Secondary Teaching Other Health Professions Engineering

Notes: Fields of study with the highest earnings growth are listing in descending order; fields of study with the lowest earnings growth are listing in ascending order of their estimated log-earnings growth rates. The adjusted estimates of mean log-earnings growth are those implied by the coefficient estimates of model 1A, which includes indicator variables for full-time/part-time status and excludes controls for occupation and industry.

What conclusion one draws from these disparate findings depends largely on whether one thinks that occupation and industry should be controlled for in estimating the earnings growth effects of field of study. It is certainly true that degree programs in some fields of study – law, medical professions, other health professions, engineering, veterinary sciences, and elementary and secondary teaching, for example – confer knowledge and skills that are specific to certain occupations and industries. If one thinks that the returns to some fields of study consist in part of preparation for employment in specific occupations and industries, then a case can be made for excluding controls for occupation and industry from both earnings level and earnings change

equations in estimating field of study effects. Unfortunately, there is no clear, generally accepted answer to the question of whether to exclude or include occupation and industry in this instance. Consequently, our findings do not sustain an unqualified answer to the question of whether there exist regression-adjusted differences in post-graduation earnings growth attributable to graduates' field of study.

5.2 Findings for Other Baseline Characteristics

This section summarizes our findings respecting the earnings growth effects of the five time-invariant baseline characteristics other than field of study that are included in the estimated earnings growth equations of male and female Bachelor's graduates: age in year of graduation, whether the degree obtained included a coop program, language first spoken, father's education, and mother's education.

Our findings for age in year of graduation exhibit no consistent pattern across the three NGS cohorts. Moreover, for any one graduate cohort, estimated age effects tend to be very different for males and females. Consider the 1982 graduation cohort: the coefficient estimates for age and age-squared are jointly highly significant for 1982 female graduates, but are jointly insignificant for 1982 male graduates. The opposite finding is obtained for the 1986 cohort: the male coefficient estimates for age and age-squared are jointly and individually highly significant whereas the corresponding female coefficient estimates are unambiguously insignificant. In both cases where age effects are significant, the sign pattern is the same: the coefficient estimate for age is negative and numerically large, while the coefficient estimate for age-squared is positive and numerically small. This pattern implies that the adjusted marginal effect of age on earnings growth is negative for younger graduates but becomes numerically smaller (less negative) for older graduates. However, the relative magnitudes of the coefficient estimates for age and age-squared is such that younger graduates experience higher earnings growth rates than do otherwise similar older graduates. But since this pattern is obtained for only two of our six subject groups, it cannot be taken as a general finding.

Three parental family background characteristics are included among the time-invariant baseline attributes of graduates: the language first spoken in childhood, mother's highest level of completed education, and father's highest level of completed education. Generally speaking, we

find little evidence that these family background characteristics are related to the post-graduation earnings growth of either male or female graduates. The coefficient estimates for language first spoken (mother tongue) are statistically jointly significant at the 5 percent level only for 1982 female graduates; they are statistically insignificant for the other five male and female graduate cohorts. The findings respecting parents' education are more mixed. On the one hand, estimates of earnings growth equations 1A and 2A, which exclude controls for occupation and industry, yield virtually no evidence of statistically significant earnings growth effects for either father's or mother's educational attainment. On the other hand, estimates of earnings growth equations 1B and 2B, which incorporate controls for occupation and industry, produce jointly significant estimates of the coefficients for father's education for the 1982 female cohort, jointly significant estimates of the coefficients for mother's education for the 1986 female cohort, and jointly significant estimates of the coefficients for father's education for the 1986 male cohort. For 1982 female graduates, women whose fathers had less than primary education had significantly lower earnings growth than women whose fathers had completed elementary education. For 1986 female graduates, model 1B yields some evidence that women whose mothers had a university degree realized significantly higher earnings growth than women whose mothers had lower levels of educational attainment; however, this finding does not find statistical confirmation in the estimates of model 2B. For 1986 male graduates, the estimates of model 2B (and less strongly the estimates of model 1B) indicate that men whose fathers had completed secondary education had higher earnings growth than men whose fathers had other levels of completed schooling. But apart from these isolated instances, our findings do not indicate that either father's or mother's educational attainment was associated with discernible differences in the post-graduation earnings growth of Bachelor's graduates.

The one time-invariant baseline characteristic for which our findings are unambiguous and consistent across cohorts is whether the degree program was a coop program incorporating a required work experience component. For both male and female graduates, none of the coefficient estimates for the coop program indicator variable in either model 1 or model 2 even approaches statistical significance at conventional test levels of 10 percent or less.

5.3 Findings for Graduates' Current Characteristics

This section summarizes our empirical findings respecting the earnings growth effects of graduates' time-varying personal and job characteristics other than occupation and industry. Discussion of the results for occupation and industry is deferred to the following section.

By far the strongest and most consistent empirical evidence obtained for any of the hypothesized covariates of earnings growth we consider is that for the full-time/part-time status of graduates' jobs and that for graduates' usual weekly hours of work. With respect to the former, the three coefficient estimates in model 1 for changes in full-time/part-time status are statistically jointly significant at the 1 percent level for both male and female graduates in all three NGS cohorts. Moreover, the individual coefficient estimates exhibit essentially the same sign pattern for all cohorts. The coefficient estimate for graduates who moved from a part-time job in year 2 to a full-time job in year 5 is positive, numerically large and individually significant; the coefficient estimate for graduates who moved from a full-time job in year 2 to a part-time job in year 5 is negative, numerically large and individually significant; and the coefficient estimate for graduates who were employed part-time in both years is either positive or negative and individually insignificant. These results imply that, compared with graduates who were employed full-time in both year 2 and year 5, those who changed from a part-time to a full-time job typically realized relatively high earnings growth rates, while those who changed from a full-time to a part-time job realized relatively low earnings growth rates. The statistical strength and consistency of these findings across cohorts is perhaps more notable in light of the fact that the earnings measure we use is an annualized earnings rate as distinct from actual annual earnings. Although actual annual earnings are likely to be positively related to hours worked by definition, there is no reason why an annualized earnings rate would be. Instead, a positive relationship between hours worked and annualized earning rates is likely to indicate that pay rates (or wage rates) are higher for full-time than for part-time jobs.

As noted above, the evidence obtained for model 2 of a systematic relationship between usual weekly hours of work and post-graduation earnings growth is just as strong as that furnished by model 1 of earnings growth effects associated with full-time/part-time status. Recall that model 2 includes five regressors to capture the earnings growth effects of graduates' usual weekly hours: linear, quadratic and cubic terms in the level of usual weekly hours in year 2; the change in usual

weekly hours between year 2 and year 5; and the product of usual weekly hours in year 2 and the year 2-toyear 5 change in usual weekly hours. For male and female graduates in both 1986 and 1990, the coefficient estimates for these five weekly hours regressors are statistically jointly significant at less than the 1 percent significance level, both with and without controls for occupation and industry transitions. Furthermore, for all four gender-cohort groups, the model 2 coefficient estimates (both with and without controls for occupation and industry) reject each of the following hypotheses at the 1 percent significance level: the marginal earnings growth effect of weekly hours in year 2 is zero;[11] the marginal effect of the change in weekly hours between year 2 and year 5 is zero;[12] and the marginal effect of the level of weekly hours in year 2 is constant.[13] These findings constitute strong evidence that the level of, and change in, usual weekly hours of work are empirically relevant covariates of both males' and females' post-graduation earnings growth.

A time-varying job characteristic for which there is moderately strong evidence of adjusted earnings growth effects is temporary/permanent job status. However, this evidence is rather variable, both across the six gender-cohort groups and across the four earnings growth models. Only for 1986 and 1990 female graduates do all four earnings growth equations yield estimates of the four temporary/permanent job status coefficients that are statistically jointly significant at the 5 percent test level. For 1982 male graduates, models 1A and 1B both yield jointly significant coefficient estimates for changes in temporary/permanent job status, whereas only model 1B produces such evidence for 1982 female graduates. For 1986 male graduates, only models 2A and 2B produce jointly significant coefficient estimates for the temporary/permanent job status regressors; models 1A and 1B give statistically weaker results. Finally, for 1990 male graduates, no model yields any evidence of statistically significant earnings growth effects associated with transitions in temporary/permanent job status. But despite their variability, the coefficient estimates for temporary/permanent job status exhibit some common sign patterns. In particular, whenever they attain individual statistical significance at conventional test levels, the

[11] The null hypothesis is that the coefficients of hours, hours-squared, hours-cubed, and the interaction term between hours and change in hours are jointly equal to zero.

[12] The null hypothesis is that the coefficients of change in hours and the interaction term between hours and change in hours are jointly equal to zero.

[13] The null hypothesis is that the coefficients of hours-squared, hours-cubed, and the interaction term between hours and change in hours are jointly equal to zero.

coefficient estimates for transitions from temporary to permanent jobs are consistently positive, while the coefficient estimates for transitions from permanent to temporary jobs are consistently negative.[14] These results imply that graduates who move from a temporary to a permanent job realized higher earnings growth than graduates who were employed in a permanent job in both years, and that graduates who moved from a permanent to a temporary job realized lower earnings growth relative to permanent job holders.

Our findings respecting class-of-worker effects on post-graduation earnings growth, like those for the effects of temporary/permanent job status, are moderately strong in terms of statistical precision but are highly variable across gender-cohort groups and between models 1 and 2. The strongest evidence for class-of-worker effects on earnings growth is obtained for male graduates in the 1982 and 1986 cohorts and for female graduates in the 1986 cohort. For male and female members of the 1990 graduate cohort, models 1 and 2 produce very different findings. For 1990 female graduates, the coefficient estimates for class of worker are jointly significant at the 5 percent level in model 2, but are not jointly significant at 10 percent in model 1. For 1990 male graduates, the opposite is true: the three class-of-worker coefficient estimates are jointly significant at the 10 percent level in model 1, but do not attain joint statistical significance at the 10 percent level in model 2. Female members of the 1982 graduate cohort constitute the only gender-cohort group for which neither model 1 nor model 2 produces any evidence of adjusted class-of-worker effects on earnings growth. For males in all three graduate cohorts, there is consistent and reasonably strong evidence that transitions from paid employment to self employment were associated with higher earnings growth. For females in the 1986 and 1990 graduate cohorts, those who were self employed in both post-graduation years and those who moved from self employment to paid employment typically realized lower earnings growth than otherwise similar female graduates who were working as paid employees in both years. Our empirical results thus indicate that transitions between paid employment and self employment have discernible effects on graduates' log-earnings growth rates, but that these effects are different in direction for female and male graduates.

[14] The coefficient estimates for graduates who were employed in temporary jobs in both year 2 and year 5 are variable in sign but are rarely statistically significant. The coefficient estimates for graduates for whom temporary/permanent job status in year 2 and/or year 5 was unknown are variable in both sign and statistical precision, but in any case are rather difficult to interpret.

The results for region of residence, like those for several other measured covariates of earnings growth, are different for different male and female graduate cohorts. To the question of whether region of residence transitions are associated with mean differences in adjusted earnings growth, the test results in Tables 2-1 and 2-2 indicate an affirmative answer for three of the six graduate cohorts, namely 1982 and 1986 male graduates and 1986 female graduates. For these three graduate cohorts, the coefficient estimates of the 11 region-of-residence indicators attain joint statistical significance at the 5 percent test level, both with and without controls for occupation and industry. But for the other three gender-cohort groups – 1982 and 1990 female graduates and 1990 male graduates – none of the four earnings growth models yields coefficient estimates for the region regressors that are jointly significant at the 5 percent test level. It is instructive to compare the estimated earnings growth effects of region transitions for male and female graduates in 1986, since aggregate economic conditions (period effects) were presumably the same for both. The only finding common to both males and females in the 1986 graduate cohort is that residence in the Atlantic Provinces in both post-graduation years is associated with substantially lower earnings growth than is residence in Ontario in both years.[15] The other statistically significant region effects are unique to either males or females. For 1986 male graduates, the estimates suggest that residence in Quebec in both years and residence in Manitoba or Saskatchewan in both years were both associated with lower earnings growth. For 1986 female graduates, lower earnings growth was associated with living in Alberta in both years, living in British Columbia in both years, and with moving to the Atlantic provinces from some other part of Canada. As these findings illustrate, the effects on earnings growth of changes in region of residence are not only different across graduate cohorts, but are also likely to be different between male and female members of the same cohort.

We conclude this section by considering the findings for two indicators of graduates' family status, their marital status and the number of dependent children they have. With respect to the latter, there is very little evidence that changes in the number of dependent children are associated with adjusted differences in the earnings growth of either female or male graduates.

[15] In the absence of controls for occupation and industry (models 1A and 2A), there is also evidence that moving to Quebec results in significantly lower post-graduation earnings growth for both males and females in the 1986 graduate cohort. However, these effects become statistically insignificant when occupation and industry are controlled for (models 1B and 2B).

The only exception to this general statement is 1986 female graduates, for whom the coefficient estimate for the transition from no children in year 2 to one or more children in year 5 is consistently negative and individually significant at the 5 percent test level, meaning that those 1986 female graduates who were without children in 1988 and with children in 1991 realized lower earnings growth rates than otherwise similar women who were without children in both post-graduation years. But apart from this one finding, there is little evidence that changes in the number of dependent children are related to the post-graduation earnings growth of either male or female graduates.

With respect to marital status, the test results in Tables 2-1 and 2-2 indicate that the estimated earnings growth effects of transitions in marital status between the second and fifth post-graduation years attain joint statistical significance at the 5 percent level (both with and without controls for occupation and industry) for only one of the six gender-cohort groups – 1990 male graduates. However, this finding may be the result of data anomalies; the only individually significant marital status effect is that for 1990 male graduates who were widowed, separated or divorced in both post-graduation years, and it is exceptionally large and positive in magnitude. There is no evidence of adjusted earnings growth differentials associated with marital status transitions for either the 1982 or 1986 cohort of male graduates. For female graduates, the evidence of marital status effects on earnings growth is both statistically quite weak[16] and highly variable across graduate cohorts. But despite their overall statistical imprecision, some of the marital status coefficient estimates for female graduates do attain individual statistical significance at conventional test levels. For 1982 female graduates, there is some evidence that women who were married in year 2 and widowed, separated or divorced in year 5, and women who were widowed, separated or divorced in years 2 and 5, had higher earnings growth rates than did women who were single never married in both post-graduation years. Among 1986 female graduates, women who were married in years 2 and 5 realized significantly lower earnings growth than women who were single both years. For both 1986 and 1990 female graduates, the

[16] For 1982 and 1986 female graduates, models 1A and 1B yield marital status coefficient estimates that are statistically jointly significant only at the 10 percent test level, while models 2A and 2B produce no evidence of marital status effects for the 1986 female graduate cohort. For 1990 female graduates, the marital status coefficient estimates attain joint statistical significance at the 5 percent level in model 1B and at the 10 percent level in model 2B, but are jointly insignificant at conventional test levels in the absence of controls for occupation and industry.

transition from widowed, separated or divorced in year 2 to married in year 5 has individually significant earnings growth effects; however, the direction of the effects differs between the two cohorts. In particular, 1986 female graduates who were widowed, separated or divorced in year 2 and married in year 5 realized lower earnings growth than did observationally similar female graduates who were single never married both years, whereas 1990 female graduates who made the same transition realized higher earnings growth. Here is an instance in which two consecutive graduate cohorts of the same sex apparently exhibit diametrically opposite earnings growth responses to exactly the same marital status transition.

5.4 Findings for Occupation and Industry

The inclusion of controls for occupation and industry in the estimated log-earnings change equations poses two sets of questions. First, do occupation and industry transitions have discernible adjusted effects on graduates' three-year log-earnings growth rates? Second, how does the introduction of controls for occupation and industry transitions alter the estimated effects of the other hypothesized determinants of earnings growth?

With respect to the first question, the F-test results in Tables 2-1 and 2-2 provide reasonably strong evidence that occupation and industry each have statistically significant direct effects on graduates' log-earnings growth rates. Of the ten sets of coefficient estimates for year 2-to-year 5 occupation transitions, eight are statistically jointly significant at the 5 percent test level. Of the ten sets of coefficient estimates for year 2-to-year 5 industry transitions, nine attain joint statistical significance at the 5 percent level. In only one case do models 1 and 2 yield conflicting inferences respecting occupation and industry effects: for 1990 male graduates, the 29 coefficient estimates for year 2-to-year 5 occupation transitions are jointly significant at the 5 percent level in model 1, but are not jointly significant even at 10 percent in model 2. The weakest evidence of occupation and industry effects is that for the 1982 cohort of female graduates, for which the occupation coefficient estimates are jointly significant at the 10 percent level (but not the 5 percent level), and the industry coefficient estimates are not jointly significant even at the 10 percent test level.

With respect to the second question, we have previously reported that estimates of field of study effects on graduates' earnings growth are not statistically robust to the introduction of controls for

occupation and industry transitions. What this finding suggests is that graduates' field of study in their Bachelor's degree programs may not have an independent effect on their post-graduation earnings growth apart from the earnings growth effects of occupation and industry. Furthermore, controlling for occupation and industry effects has more general implications for the empirical relevance of all time-invariant baseline characteristics included in our empirical earnings growth equations. Once year 2-to-year 5 transitions in occupation and industry are accounted for, the evidence that graduates' time-invariant baseline characteristics are empirically relevant in accounting for their post-graduation earnings growth becomes substantially weaker. In the absence of controls for occupation and industry transitions, the coefficient estimates for all baseline characteristics in models 1 and 2 are statistically jointly significant at the 1 percent test level for both males and females in all three graduate cohorts. But in the presence of controls for occupation and industry transitions, only four of the ten sets of coefficient estimates for all baseline characteristics retain their joint statistical significance at the 1 percent level, although eight of the ten are jointly significant at the 5 percent level. The two sets of statistically insignificant coefficient estimates for all baseline characteristics are the model 1B estimates for 1982 male graduates and the model 1B estimates for 1990 female graduates, neither of which attains joint statistical significance even at the 10 percent test level.

Given their apparent empirical relevance in accounting for post-graduation earnings growth, how do adjusted log-earnings growth rates across occupation and industry transitions compare for male and female graduates? Tables 5-1, 5-2 and 6-1, 6-2 provide some descriptive information on this question. They tabulate, for male and female graduates in the 1986 and 1990 cohorts, the regression-adjusted log-earnings growth rates for occupation and industry transitions implied by the estimates of earnings growth model 1B (which controls for full-time/part-time status rather that usual weekly hours).

The adjusted log-earnings growth rates associated with occupation transitions (Tables 5-1 and 5-2) are generally higher for females than males in the 1986 cohort, but are lower for females than males in the 1990 cohort.[17] However, because some of the differences in the regression-

[17] The mean of the adjusted log-earnings growth rates for the 30 occupation transitions is 0.2117 for 1986 female graduates and 0.1062 for 1986 male graduates; for 1990 graduates, the mean of the adjusted log-earnings growth rates for these occupation transitions is 0.1370 for females and 0.1988 for males.

adjusted earnings growth rates of male and female graduates in the occupation transition categories reflect male-female differences in intercept coefficient estimates and age effects, we use the estimates in Tables 5-1 and 5-2 to perform male-female comparisons of the ordinal rankings of occupation transitions on the basis of their estimated log-earnings growth rates.

Table 5-1: **Adjusted Mean Log-Earnings Growth by Occupation Transition, 1986 Male and Female Graduates, Model 1**

Occupation Transition 1988-1991	*Females*	*Males*
Management, both years	.1414 (1.684)	.1416 (1.549)
Management related, both years	.2708 (3.341)	.2149 (2.301)
Physical/Biological Sciences, both years	.1718 (1.725)	.08155 (0.842)
Architecture/Engineering, both years	.1416 (1.300)	.1525 (1.518)
Mathematics/Computer Science, both years	.1438 (1.557)	.1164 (1.214)
Sociology/Religion, both years	.2833 (3.322)	.08075 (0.989)
Post-Secondary Teaching, both years	.1741 (1.061)	.004110 (0.025)
Elementary/Secondary Teaching, both years	.1099 (1.094)	.1552 (1.524)
Health Diagnostic Professions, both years	.7439 (2.814)	.5118 (2.787)
Other Health Occupations, both years	.3839 (3.551)	.1280 (1.190)
Arts/Recreation, both years	.2448 (2.152)	.03375 (0.298)
Clerical, both years	.1773 (2.326)	-.005972 (-0.058)
Sales, both years	.1415 (1.277)	.07517 (0.860)
Clerical, both years	.1773 (2.326)	-.005972 (-0.058)
Sales, both years	.1415 (1.277)	.07517 (0.860)
Services, both years	.2009 (2.240)	.1019 (1.220)

(continued)

Table 5-1 (continued)

Occupation Transition 1988-1991	*Females*	*Males*
Clerical, both years	.1773 (2.326)	-.005972 (-0.058)
Sales, both years	.1415 (1.277)	.07517 (0.860)
Services, both years	.2009 (2.240)	.1019 (1.220)
Production, both years	.1589 (1.891)	.07430 (0.820)
To Management, year 5	.2852 (3.868)	.1955 (2.210)
To Management Related, year 5	.2586 (3.293)	.08882 (0.914)
To Physical/Biological Sciences, year 5	.3355 (1.655)	.2874 (1.851)
To Architecture/Engineering, year 5	.1108 (0.984)	.06046 (0.416)
To Mathematics/Computer Science, year 5	.1209 (1.355)	.06567 (0.606)
To Sociology/Religion, year 5	.2611 (2.147)	.07370 (0.495)
To Post-Secondary Teaching, year 5	.3322 (0.927)	.1302 (0.550)
To Elementary/Secondary teaching, year 5	.2645 (2.489)	.5418 (3.244)
To Health Diagnostic Professions, year 5	.6218 (1.727)	.4578 (2.630)
To Other Health Occupations, year 5	.5728 (2.654)	-.5358 (-1.516)
To Arts/Recreation, year 5	.08577 (0.767)	.01663 (0.087)
To Clerical, year 5	.1136 (1.376)	.06463 (0.613)
To Sales, year 5	.2278 (2.806)	-.02694 (-0.276)
To Services, year 5	.-.4377 (-1.813)	-.1031 (-0.516)
To Production, year 5	-.2894 (-1.904)	.003569 (0.037)
F-statistic (p-value)	2.08 (0.0007)	2.88 (0.0000)
Number of observations	1,736	1,717

Notes: The adjusted estimates of mean log-earnings growth rates are those implied by the coefficient estimates of model 1B (which includes controls for full-time/part-time status) and are computed for a graduate who was 24 years of age in the year of graduation and who otherwise has the reference group characteristics for all other measured covariates of earnings growth. The figures in parentheses are t-ratios. The F-statistics test the null hypothesis that mean log-earnings growth rates are equal across the 30 occupation transitions.

Table 5-2: **Adjusted Mean Log-Earnings Growth by Occupation Transition, 1990 Male and Female Graduates, Model 1**

Occupation Transition 1992-1995	*Females*	*Males*
Management, both years	.1609 (2.768)	.2237 (2.494)
Management related, both years	.1977 (2.904)	.2104 (2.365)
Physical/Biological Sciences, both years	.06037 (0.815)	.1133 (1.049)
Architecture/Engineering, both years	.07762 (0.754)	.1754 (1.806)
Mathematics/Computer Science, both years	.1766 (1.881)	.2035 (2.050)
Sociology/Religion, both years	.1465 (2.111)	.1872 (1.807)
Post-Secondary Teaching, both years	-.1768 (-0.816)	-.2380 (-0.883)
Elementary/Secondary Teaching, both years	.07470 (0.993)	.1317 (1.122)
Health Diagnostic Professions, both years	.09071 (0.575)	.2546 (1.551)
Other Health Occupations, both years	.2349 (3.095)	.3319 (2.950)
Arts/Recreation, both years	.1754 (1.758)	.1554 (1.230)
Clerical, both years	.1577 (2.578)	.05533 (0.374)
Sales, both years	-.02362 (-0.182)	.2580 (2.837)
Services, both years	.3339 (3.441)	.2811 (2.021)
Production, both years	.1949 (2.748)	.2204 (1.637)
To Management, year 5	.2097 (3.081)	.2836 (3.130)
To Management Related, year 5	.1348 (1.449)	.2504 (2.583)
To Physical/Biological sciences, year 5	.1684 (1.087)	.1239 (1.124)
To Architecture/Engineering, year 5	.1769 (1.955)	.1770 (1.619)
To Mathematics/Computer Science, year 5	.2800 (2.849)	.1970 (1.335)
To Sociology/Religion, year 5	.1642 (1.414)	-.06526 (-0.437)
To Post-Secondary Teaching, year 5	-.2909 (-1.773)	.2960 (1.149)
To Elementary/Secondary teaching, year 5	.5601 (3.073)	.2644 (0.811)

(continued)

Table 5-2 (continued)

Occupation Transition 1992-1995	*Females*	*Males*
To Elementary/Secondary teaching, year 5	.5601 (3.073)	.2644 (0.811)
To Health Diagnostic Professions, year 5	-.08178 (-0.359)	.8182 (2.103)
To Other Health Occupations, year 5	.4446 (2.096)	.1036 (0.917)
To Arts/Recreation, year 5	.3883 (2.006)	.007847 (0.049)
To Clerical, year 5	.2052 (1.110)	.3559 (2.186)
To Sales, year 5	.1608 (1.918)	.2670 (2.289)
To Services, year 5	-.1774 (-1.129)	.2997 (1.867)
To Production, year 5	-.1142 (-0.405)	.02225 (0.157)
F-statistic (p-value)	2.08 (0.0006)	1.57 (0.0273)
Number of observations	1,776	1,741

Notes: The adjusted estimates of mean log-earnings growth rates are those implied by the coefficient estimates of model 1B (which includes controls for full-time/part-time status) and are computed for a graduate who was 24 years of age in the year of graduation and who otherwise has the reference group characteristics for all other measured covariates of earnings growth. The figures in parentheses are t-ratios. The F-statistics test the null hypothesis that mean log-earnings growth rates are equal across the 30 occupation transitions.

Such comparisons serve to indicate if the rankings of occupation transitions according to their estimated regression-adjusted earnings growth rates are similar or different for male and female graduates in a given NGS cohort. The Spearman rank correlation coefficient for male and female members of the 1986 graduate cohort equals 0.455, a value that indicates at least a moderate positive association between the male and female rankings of occupation transitions by their adjusted earnings growth rates. For the 1990 graduate cohort, in contrast, the corresponding rank correlation coefficient for males and females equals only 0.0394; the male and female rankings of occupation transitions by their estimated earnings growth rates are evidently unrelated to one another for the 1990 cohort.[18] To lend some context to the comparisons of male and female

[18] Further evidence of the lack of correlation between the male and female rankings of occupation transitions for 1990 graduates is the finding that the five occupation transitions that have the highest adjusted log-earnings growth rates for 1990 female graduates (transitions to elementary/secondary teaching in year 5, transitions to other health occupations in year 5, transitions to arts and recreation occupations in year 5, employment in service occupations both years, and transitions to mathematics and computer science occupations in year 5) are completely different from the five occupation transitions that exhibit the highest adjusted log-earnings growth rates for 1990 male graduates (transitions to health diagnostic professions in year 5, transitions to clerical occupations in year 5, employment in other health occupations both years, transitions to service occupations in year 5, and transitions to post-secondary teaching in year 5).

rankings of occupation transitions for each cohort, we compare the rankings of occupation transitions for the graduate cohorts of 1986 and 1990. Such comparisons indicate how stable across successive cohorts are the rankings of occupation transitions by their adjusted log-earnings growth rates. The rank correlation coefficient for the 1986 and 1990 female rankings of occupation transitions equals 0.124, while that for the corresponding 1986 and 1990 male rankings equals 0.362. The 1986 and 1990 rankings of occupation transitions are evidently more similar for male graduates than for female graduates, although for neither males nor females could the 1986 and 1990 rankings accurately be characterized as very similar, i.e., as highly positively correlated. In other words, for neither male nor female graduates are the rankings of occupation transitions by their adjusted log-earnings growth rates very stable or similar between the 1986 and 1990 NGS cohorts.

The adjusted log-earnings growth rates associated with industry transitions (Tables 6-1 and 6-2) are substantially higher for females than for males. For the 1986 graduate cohort, the mean regression-adjusted earnings growth rate for the 26 industry transitions equals 0.251 for females and 0.166 for males; for the 1990 graduate cohort, the corresponding means are 0.248 for females and only 0.0468 for males. Tables 6-1 and 6-2 also reveal some very large numerical differences between female and male graduates in the estimated log-earnings growth rates for particular industry transitions, most of which favour female graduates;[19] moreover, both the size and frequency of such large differences are greater for the 1990 cohort than for the 1986 cohort. For the 1986 cohort, for example, the transition to education services in year 5 is associated with an estimated log-earnings growth rate of 0.31 for females and -0.15 for males; for the 1990 cohort, the same industry transition is associated with an estimated log-earnings growth rate of 0.54 for females but only 0.017 for males. But because male-female differences in the levels of the regression-adjusted earnings growth rates in Tables 6-1 and 6-2 reflect not only male-female differences in the estimated effects of industry transitions, it is more appropriate to ask how similar or different are the male and female rankings of industry transitions according to their regression-adjusted earnings growth rates. The evidence on this question differs markedly for the 1986 and 1990 graduate cohorts. The rank correlation coefficient for male and female rankings

[19] Point estimates of the adjusted earnings growth rates are greater for females than males in 20 of the 26 industry transitions for the 1986 graduate cohort, and in 24 of the 26 industry transitions for the 1990 graduate cohort.

of industry transitions is - 0.0896 for the 1986 graduate cohort, and 0.415 for the 1990 graduate cohort. For the 1990 cohort, there thus exists a moderately strong positive association between male and female rankings of industry transitions. But for the 1986 cohort, there appears to be no association between the male and female rankings of industry transitions on the basis of their regression-adjusted earnings growth rates. It is instructive to compare within-cohort male-female differences in the ranking of industry transitions with cross-cohort differences for each gender. The rank correlation coefficient for the 1986 and 1990 rankings of industry transitions equals - 0.0701 for female graduates and 0.245 for male graduates. In other words, for neither males nor females is there any evidence of a strong positive association – i.e., a high degree of similarity – between the earnings growth rankings of industry transitions in successive graduate cohorts. In fact, our estimates suggest that the ordinal rankings of industry transitions according to their adjusted earnings growth rates exhibit a greater degree of similarity between male and female graduates in the 1990 cohort than between female (or male) graduates in the 1986 and 1990 NGS cohorts. There appear to be substantial differences in the rank ordering of industry transitions not only between male and female members of the same graduate cohort, but also between successive graduate cohorts of the same gender.

Table 6-1: **Adjusted Mean Log-Earnings Growth by Industry Transition, 1986 Male and Female Graduates, Model 1**

Industry Transition 1988-1991	*Females*	*Males*
Primary industries, both years	.3173	.09740
	(3.590)	(1.094)
Low tech manufacturing, both years	.2538	.3013
	(2.955)	(1.976)
Medium tech manufacturing, both years	.1979	.1449
	(2.011)	(1.687)
High tech manufacturing, both years	.2353	.1410
	(3.205)	(1.697)
Construction, transportation, communication and utilities, both years	.2325	.1559
	(3.694)	(1.950)
Wholesale trade, both years	.3620	.1953
	(3.531)	(2.274)
Retail trade, both years	.1773	-.005972
	(2.326)	(-0.058)
Finance/Insurance/Real Estate, both years	.2501	.1281
	(4.518)	(1.475)

(continued)

Table 6-1 (continued)

Industry Transition 1988-1991	*Females*	*Males*
Business services, both years	.3027	.2542
	(4.262)	(3.005)
Government services, both years	.2762	.09690
	(3.990)	(1.264)
Education services, both years	.2609	.02406
	(2.690)	(0.256)
Health services, both years	.08241	.1615
	(1.209)	(1.652)
Personal services, both years	.2498	.1559
	(3.120)	(1.447)
To Primary industries, year 5	.2904	.3063
	(3.099)	(2.463)
To Low tech manufacturing, year 5	.3158	.08078
	(3.023)	(0.767)
To Medium tech manufacturing, year 5	.7776	.1995
	(2.929)	(2.078)
To High tech manufacturing, year 5	.2048	.2598
	(2.423)	(3.038)
To Construction, transportation, communication and utilities, year 5	.3185	.2196
	(3.884)	(2.565)
To Wholesale trade, year 5	.1162	.1852
	(0.952)	(2.004)
To Retail trade, year 5	.07785	.1226
	(0.732)	(0.880)
To Finance, insurance, real estate, year 5	.2476	.2108
	(2.835)	(2.317)
To Business services, year 5	.2169	.09508
	(2.079)	(0.989)
To Government services, year 5	.2620	.2311
	(3.317)	(2.134)
To Education services, year 5	.3106	-.1452
	(3.262)	(-0.999)
To Health services, year 5	.1772	.3808
	(1.825)	(2.129)
To Personal services, year 5	.01983	.3074
	(0.167)	(2.479)
F-statistic	1.65	2.06
(p-value)	(0.0224)	(0.0016)
Number of observations	1,736	1,717

Notes: The adjusted estimates of mean log-earnings growth rates are those implied by the coefficient estimates of model 1B (which includes controls for full-time/part-time status) and are computed for a graduate who was 24 years of age in the year of graduation and who otherwise has the reference group characteristics for all other measured covariates of earnings growth. The figures in parentheses are t-ratios. The F-statistics test the null hypothesis that mean log-earnings growth rates are equal across the 26 industry transitions.

Our findings respecting the post-graduation earnings growth effects of occupation and industry transitions between the second and fifth post-graduation years point to two summary conclusions. First, transitions in both occupation and industry have statistically significant adjusted effects on the log-earnings growth rates of male and female Bachelor's graduates. Second, these adjusted earnings growth effects tend to be highly variable, both between male and female graduates in a given cohort and across successive graduate cohorts of the same gender. Furthermore, differences in the rankings of occupation and industry transitions on the basis of their adjusted earnings growth rates appear to be at least as great between successive graduate cohorts of the same gender as between male and female members of the same graduate cohort.

Table 6-2: **Adjusted Mean Log-Earnings Growth by Industry Transition, 1990 Male and Female Graduates, Model 1**

Industry Transition 1992-1995	*Females*	*Males*
Primary industries, both years	.1583	.1472
	(1.941)	(0.936)
Low tech manufacturing, both years	.09459	-.07013
	(1.129)	(-0.483)
Medium tech manufacturing, both years	.2720	.06318
	(3.666)	(0.445)
High tech manufacturing, both years	.3021	.04750
	(4.618)	(0.365)
Construction, transportation, communication and utilities, both years	.1905	.01765
	(2.375)	(0.138)
Wholesale trade, both years	.1967	-.1702
	(2.543)	(-0.781)
Retail trade, both years	.1577	.05533
	(2.578)	(0.374)
Finance/Insurance/Real Estate, both years	.2354	-.01772
	(3.956)	(-0.136)
Business services, both years	.2869	.1176
	(4.135)	(0.919)
Government services, both years	.07909	-.02781
	(1.468)	(-0.237)
Education services, both years	.2268	.08784
	(3.521)	(0.696)
Health services, both years	.1753	-.02916
	(3.017)	(-0.218)
Personal services, both years	.2641	.02812
	(3.769)	(0.192)

(continued)

Table 6-2 (continued)

Industry Transition 1992-1995	*Females*	*Males*
To Primary industries, year 5	.3307	.3847
	(1.865)	(2.341)
To Low tech manufacturing, year 5	.02924	-.005640
	(0.171)	(-0.036)
To Medium tech manufacturing, year 5	.1298	.07923
	(1.337)	(0.352)
To High tech manufacturing, year 5	.5953	.1818
	(2.658)	(1.270)
To Construction, transportation, communication and utilities, year 5	.4110	.1193
	(2.023)	(0.684)
To Wholesale trade, year 5	.4948	.01651
	(4.384)	(0.097)
To Retail trade, year 5	-.1096	-.2157
	(-0.696)	(-1.136)
To Finance, insurance, real estate, year 5	.3834	.05207
	(3.002)	(0.371)
To Business services, year 5	.06851	.05109
	(0.450)	(0.387)
To Government services, year 5	.1930	.2672
	(2.312)	(1.727)
To Education services, year 5	.5354	.01714
	(3.288)	(0.082)
To Health services, year 5	.4963	.1360
	(2.429)	(0.804)
To Personal services, year 5	.2509	-.1153
	(1.986)	(-0.749)
F-statistic	2.38	2.49
(p-value)	(0.0001)	(0.0001)
Number of observations	1,776	1,741

Notes: The adjusted estimates of mean log-earnings growth rates are those implied by the coefficient estimates of model 1B (which includes controls for full-time/part-time status) and are computed for a graduate who was 24 years of age in the year of graduation and who otherwise has the reference group characteristics for all other measured covariates of earnings growth. The figures in parentheses are t-ratios. The F-statistics test the null hypothesis that mean log-earnings growth rates are equal across the 26 industry transitions.

5.5 Male-Female Coefficient Differences

To this point in the investigation, we have proceeded on the maintained assumption that all coefficients in the log-earnings growth functions are different between male and female graduates in each of the three NGS cohorts. In this section, we report the results of subjecting this assumption to formal statistical tests. These tests for male-female coefficient equality are performed by estimating for each cohort a pooled full-interaction earnings growth equation that includes two sets of regressors: (1) all the original regressors included in the separate male and

female log-earnings growth equations; and (2) a complete set of interactions between a male indicator variable and all the original regressors. The pooled earnings growth equation so obtained is estimated on the combined samples of male and female graduates for each NGS graduate cohort. The slope coefficient on the male interaction term for a given regressor represents the difference between the male and female coefficients for that regressor (i.e., the male coefficient for that regressor minus the corresponding female coefficient); the slope coefficient on the original regressor itself is the corresponding female slope coefficient. The tests for male-female coefficient equality consist of F-tests of exclusion (or zero) restrictions on the coefficients of some or all of the male interaction regressors in the pooled full-interaction log-earnings growth equations.

Tables 7-1 and 7-2 tabulate, for models 1 and 2 respectively, the p-values for F-tests of the hypothesis of male-female coefficient equality for some or all of the explanatory variables in the log-earnings growth equations. The tests for overall male-female coefficient equality provide reasonably strong evidence against the null hypothesis for the 1986 and 1990 NGS cohorts, but not for the 1982 cohort. The null hypothesis of joint male-female equality for all coefficients (including the intercept) is rejected at marginal significance levels less than 1 percent for the 1986 and 1990 cohorts, but is not rejected for the 1982 cohort even at the 10 percent significance level. Identical results are obtained for the null hypothesis of joint male-female equality for all slope coefficients (excluding the intercept coefficient).

Perhaps the most remarkable finding to emerge from the test results in Tables 7-1 and 7-2 is the virtual absence of evidence of male-female coefficient differences for graduates' time-invariant baseline characteristics. For all three NGS graduate cohorts and all four earnings growth models, the hypothesis that the 27 slope coefficients of the time-invariant regressors are jointly equal for male and female graduates is not rejected at conventional significance levels of 10 percent or less. There is even less evidence of male-female differences in the earnings growth effects of field of study. Across all graduate cohorts and earnings growth models, the p-values for F-tests of the null hypothesis that all field of study coefficients are jointly equal for male and female graduates never exceed 0.20; in other words, the null hypothesis of joint male-female coefficient equality for the field of study indicator variables cannot be rejected even at the 20 percent significance level. Finally, there is almost no evidence of male-female coefficient differences for

any of the baseline characteristics other than field of study. Models 1A and 1B yield evidence of male-female differences in age effects for the 1982 and 1986 graduate cohorts, and model 2B produces evidence of male-female differences in the earnings growth effects of father's education and mother's education for the 1990 cohort. But apart from these isolated cases, there is no evidence of male-female differences in the effects of graduates' baseline characteristics on their post-graduation log-earnings growth rates.

The evidence of male-female coefficient differences is substantially stronger for the time-varying current characteristics of graduates and their jobs than for the time-invariant baseline characteristics. Only two of the ten F-tests reported in Tables 7-1 and 7-2 fail to reject, at marginal significance levels less than 5 percent, the null hypothesis that the male and female coefficients of all time-varying regressors are jointly equal. The two exceptions are the estimates of models 1A and 1B for the 1982 graduate cohort, for which joint male-female coefficient equality for all time-varying covariates cannot be rejected at conventional significance levels. The time-varying characteristic that exhibits the most consistent evidence of male-female coefficient differences is marital status; estimates of all four earnings growth models for both the 1986 and 1990 graduate cohorts reject the null hypothesis of male-female coefficient equality for marital status at the 5 percent significance level. At the other end of the spectrum, the marginal effects of the hours of work variables differed little for men and women in the 1986 and 1990 cohorts. In both cohorts, none of the individual hours coefficients (year 2 hours, year 2 hours squared, year 2 hours cubed, Δhours and Δhours*year 2 hours) were significantly different for men and women. When considered jointly, the null hypothesis of coefficient equality could only be rejected in Model 2b (industry and occupation included) for the 1986 cohort. Taking the results as a whole though, the evidence of male-female coefficient differences for the time-varying characteristics is strongest for the 1986 cohort and weakest for the 1982 cohort.

In light of the finding that graduates' time-invariant baseline characteristics have similar earnings growth effects for male and female graduates, we formulate and estimate a pooled earnings growth equation that restricts the male and female coefficients of all time-invariant regressors to be equal but allows the male and female coefficients of all time-varying regressors (and the constant term) to differ. The pooled partial-interaction regression equation we estimate conforms to the specification of model 1: it controls for full-time/part-time status rather than usual weekly

hours of work. The slope coefficients of graduates' time-invariant baseline characteristics in this restricted model are the marginal earnings growth effects of these baseline characteristics for

Table 7-1: Joint F-tests for Male-Female Coefficient Equality in the Log-Earnings Growth Equations: Model 1 Male and Female Bachelor's Graduates, 1982, 1986 and 1990

Male-Female Coefficient Equality for:	*NGS Cohorts*		
	1982	1986	1990
Model 1A: All variables except Occupation and Industry			
All Coefficients, including intercept (58)	.1157	.0010	.0000
All Slope Coefficients, excluding intercept (57)	.2684	.0012	.0000
All Time-Invariant Regressors (27)	.2589	.6522	.4222
Field of study (14)	.2394	.8736	.5371
Coop program (1)	.2691	.3148	.9283
Age (2)	.0168	.0706	.5609
Language first spoken (2)	.3601	.3737	.2417
Father's education (4)	.4181	.7486	.2707
Mother's education (4)	.7138	.2035	.4243
All Time-Varying Regressors (30)	.2206	.0014	.0000
Class of worker (3)	.5769	.0249	.2918
Full-time/Part-time job (3)	.0343	.5449	.6848
Temporary/Permanent job (4)	.3613	.0080	.0869
Region of residence (11)	.8495	.6224	.9006
Marital Status (6)	.0766	.0315	.0201
Number of children (3)	.3065	.1407	.0382
Model 1B: All variables including Occupation and Industry			
All Coefficients, including intercept (112)	.4249	.0000	.0000
All Slope Coefficients, excluding intercept (111)	.6028	.0000	.0000
All Time-Invariant Regressors (27)	.2431	.5004	.1310
Field of study (14)	.2503	.7955	.6568
Coop program (1)	.3453	.3520	.8381
Age (2)	.0170	.0501	.3353
Language first spoken (2)	.3884	.2690	.1192
Father's education (4)	.4516	.5099	.1102
Mother's education (4)	.5814	.2222	.1081
All Time-Varying Regressors (84)	.5974	.0000	.0002
Class of worker (3)	.7046	.0300	.3271
Full-time/Part-time job (3)	.0496	.2571	.8409
Temporary/Permanent job (4)	.6463	.0087	.1001
Region of residence (11)	.8538	.5044	.7452
Marital Status (6)	.1055	.0207	.0006
Number of children (3)	.3312	.1173	.0684
Occupation (29)	.8200	.0770	.2682
Industry (25)	.1009	.0081	.2177

Notes: The figures in the table are p-values for F-tests of the null hypothesis that the male and female regression coefficients for each explanatory variable are jointly equal in the log-earnings growth equation. The figures in parentheses in the first column are the number of coefficients corresponding to each set of explanatory variables, and hence the number of coefficient restrictions specified by the null hypothesis.

Table 7-2: **Joint F-tests for Male-Female Coefficient Equality in the Log-Earnings Growth Equations: Model 2**
Male and Female Bachelor's Graduates, 1986 and 1990

Male-Female Coefficient Equality for:	*NGS Cohorts* 1986	1990
Model 2A: All variables except Occupation and Industry		
All Coefficients, including intercept (60)	.0051	.0002
All Slope Coefficients, excluding intercept (59)	.0054	.0005
All Time-Invariant Regressors (27)	.7466	.2493
Field of study (14)	.9770	.3668
Coop program (1)	.3422	.7525
Age (2)	.1433	.5901
Language first spoken (2)	.3724	.3634
Father's education (4)	.3799	.1406
Mother's education (4)	.2472	.2966
All Time-Varying Regressors (32)	.0132	.0015
Class of worker (3)	.0364	.1899
Usual Weekly Hours (5)	.7342	.6927
Temporary/Permanent job (4)	.0184	.2931
Region of residence (11)	.6813	.8725
Marital Status (6)	.0151	.0036
Number of children (3)	.1692	.0663
Model 2B: All variables including Occupation and Industry		
All Coefficients, including intercept (114)	.0000	.0003
All Slope Coefficients, excluding intercept (113)	.0000	.0005
All Time-Invariant Regressors (27)	.6431	.1550
Field of study (14)	.8105	.5720
Coop program (1)	.7153	.7841
Age (2)	.1752	.3871
Language first spoken (2)	.5382	.2669
Father's education (4)	.3780	.0369
Mother's education (4)	.3160	.0663
All Time-Varying Regressors (86)	.0000	.0010
Class of worker (3)	.0126	.3017
Usual Weekly Hours (5)	.0312	.0668
Temporary/Permanent job (4)	.0119	.3457
Region of residence (11)	.4387	.6697
Marital Status (6)	.0407	.0074
Number of children (3)	.0284	.0879
Occupation (29)	.0395	.1345
Industry (25)	.0058	.1558

Notes: The figures in the table are p-values for F-tests of the null hypothesis that the male and female regression coefficients for each explanatory variable are jointly equal in the log-earnings growth equation. The figures in parentheses in the first column are the number of coefficients corresponding to each set of explanatory variables, and hence the number of coefficient restrictions specified by the null hypothesis.

both male and female graduates. Table 8 reports the unadjusted and regression-adjusted mean log-earnings growth rates for the 15 fields of study implied by the estimates of the pooled partial-interaction log-earnings growth model. Note that these log-earnings growth rates are those for all graduates, male and female, in each of the three NGS cohorts.

Three major findings emerge from the results in Table 8. First, for all three graduate cohorts, an F-test decisively rejects the null hypothesis that graduates' mean log-earnings growth rates, either unadjusted or adjusted, are jointly equal across the 15 fields of study. In other words, the differences in adjusted (and unadjusted) mean log-earnings growth rates across fields of study are statistically jointly significant at marginal significance levels less than 1 percent for all three graduate cohorts. Second, for all three graduate cohorts, the ordinal rankings of the 15 fields of study by their unadjusted and their adjusted log-earnings growth rates are very similar to each other. The rank correlation coefficient for the unadjusted and adjusted rankings of fields of study is 0.939 for the 1982 cohort, 0.939 for the 1986 cohort, and 0.929 for the 1990.[20] These values are indicative of a strong positive association between the adjusted and unadjusted earnings growth rankings of fields of study; those fields of study that have high (low) unadjusted log-earnings growth rates also tend to have high (low) regression-adjusted log-earnings growth rates. The third finding pertains to the stability of the earnings growth rankings of fields of study across successive graduate cohorts. There is a moderately strong positive association – i.e., a moderately high degree of similarity – between the adjusted (unadjusted) rankings of field of study for the 1982 and 1986 graduate cohorts: the rank correlation coefficient equals 0.661 for the adjusted rankings and 0.814 for the unadjusted rankings. However, there is very little association between the adjusted (and unadjusted) rankings of field of study for the 1986 and 1990 graduate cohorts: the rank correlation coefficient equals 0.0679 for the adjusted rankings and 0.296 for the unadjusted rankings. So while the earnings growth rankings of fields of study for the 1982 and 1986 graduate cohorts are quite similar to each other, the rankings for the 1990 graduate cohort are quite different from those for the two earlier cohorts.

[20] The conventional Pearson correlation coefficient for the unadjusted and adjusted log-earnings growth rates by field of study is 0.928 for 1982 graduates, 0.905 for 1986 graduates, and 0.919 for 1990 graduates. These values provide further evidence of a strong positive correlation between the unadjusted and adjusted log-earnings growth rates for the 15 fields of study.

Table 8: **Unadjusted and Adjusted Mean Log-Earnings Growth by Field of Study for 1982, 1986 and 1990 Male and Female Gaduates**

Field of Study	*1982 Cohort*		*1986 Cohort*		*1990 Cohort*	
	Unadj	Adjusted	Unadj	Adjusted	Unadj	Adjusted
No field of specialization	.2318	.1243	.2307	.2484	.2740	.1723
	(3.535)	(2.397)	(4.491)	(5.374)	(6.301)	(3.051)
Elementary/secondary teaching	.1526	.1476	.1517	.1672	.1009	.08033
	(5.778)	(3.987)	(5.808)	(4.518)	(5.180)	(2.139)
Other education	.1966	.1653	.2174	.1740	.1848	.1461
	(5.028)	(3.364)	(5.225)	(3.486)	(5.523)	(3.146)
Fine arts and humanities	.2337	.1793	.1742	.1704	.2892	.2436
	(5.146)	(3.256)	(4.726)	(4.623)	(6.877)	(4.689)
Commerce	.2898	.2590	.2318	.2488	.2037	.1666
	(18.23)	(6.812)	(12.84)	(7.575)	(8.974)	(4.082)
Economics	.3065	.2634	.2313	.1830	.2616	.1826
	(6.370)	(4.422)	(3.958)	(3.156)	(4.608)	(2.605)
Law	.4093	.4041	.3598	.3730	.1956	.1202
	(6.767)	(6.081)	(10.23)	(7.647)	(3.136)	(1.714)
Social Sciences (except Economics)	.2389	.2065	.2687	.2564	.2099	.1537
	(11.83)	(5.281)	(9.011)	(7.811)	(6.660)	(4.075)
Agricultural and biological sciences	.2336	.1858	.2303	.2269	.2239	.1809
	(6.762)	(4.109)	(7.285)	(5.946)	(6.553)	(4.149)
Veterinary sciences	.1134	.1377	.1424	.1615	.2101	.1933
	(1.204)	(1.507)	(2.306)	(2.495)	(3.365)	(2.429)
Engineering	.2038	.1625	.2054	.2075	.1613	.1153
	(16.53)	(4.263)	(11.15)	(6.092)	(10.63)	(2.696)
Medical professions (doctors, etc.)	.4027	.3319	.3045	.3274	.4036	.3989
	(7.438)	(4.726)	(4.966)	(4.551)	(7.338)	(5.535)
Other health professions	.08786	.1071	.08584	.1523	.03408	.06988
	(3.459)	(2.779)	(3.032)	(4.343)	(1.752)	(1.832)
Computer sciences	.2058	.1692	.2497	.2831	.1817	.1269
	(11.26)	(4.323)	(10.46)	(6.839)	(8.267)	(2.739)
Mathematical and physical sciences	.2319	.1785	.2109	.1994	.2386	.1818
	(9.897)	(4.620)	(7.408)	(5.152)	(10.49)	(4.523)
F-statistic	5.87	5.22	3.93	3.72	8.01	4.34
(p-value)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Number of observations	3,467	3,467	3,453	3,453	3,517	3,517

Notes: The adjusted estimates of mean log-earnings growth rates are those implied by the coefficient estimates of a restricted pooled version of model 1A that restricts the coefficients of all 27 time-invariant regressors to be equal for male and female graduates; they are computed for a graduate who was 24 years of age in the year of graduation and who otherwise has the reference group characteristics for all other measured covariates of earnings growth. The figures in parentheses are t-ratios. The F-statistics test the null hypothesis that the mean log-earnings growth rates of male and female graduates are equal across the 15 fields of study.

The results in Table 8 can be used to determine if there are some fields of study that are consistently associated with relatively high log-earnings growth rates across the three graduate cohorts, and others that are consistently associated with relatively low log-earnings growth rates. First, we ask which fields of study frequently or always rank among the top third of the 15 fields of study in terms of their adjusted and unadjusted log-earnings growth rates. Degrees in medical

professions rank in the top third of all six rankings of fields of study in Table 8; in fact, such degrees had the highest log-earnings growth rates (adjusted and unadjusted) for the 1990 cohort and the second highest for the 1982 and 1986 cohorts. Degrees in commerce, in economics, in law, and in social sciences rank in the top third of four of the six rankings in Table 8. Which fields of study frequently or always rank among the bottom third of the earnings growth rankings of fields of study? Two fields of study – other health professions, and elementary and secondary teaching – rank in the bottom third of all six rankings of fields of study in Table 8; in fact, degrees in other health professions constitute the lowest earnings growth field in all six rankings. In addition, degrees in veterinary sciences and degrees in engineering rank in the bottom third of at least four of the six rankings.

Three other results for the pooled partial-interaction sample regression functions are worth noting. First, for the 1986 and 1990 graduate cohorts but not the 1982 cohort, the field-of-study coefficient estimates are statistically jointly significant at the 1 percent level even in the presence of controls for occupation and industry transitions.[21] This finding constitutes stronger evidence of empirically discernible differences in adjusted log-earnings growth rates across fields of study than that furnished by the separate male and female estimates of model 1 that control for occupation and industry. Second, for all three graduate cohorts, year 2-to-year 5 transitions in full-time/part-time status are again consistently associated with numerically large and statistically highly significant differences in graduates' log-earnings growth rates. In particular, compared with graduates who were employed full time in both post-graduation years, graduates who moved from part-time employment in year 2 to full-time employment in year 5 realized substantially higher earnings growth, whereas those who moved from full-time to part-time employment realized much lower earnings growth. Third, the pooled partial-interaction sample regression equations provide strong evidence of male-female differences in the coefficients of all time-varying current characteristics for the 1986 and 1990 graduate cohorts, but much weaker evidence of such male-female coefficient differences for the 1982 graduate cohort. This finding essentially replicates those reported in Table 7-1 for the separate male and female estimates of earnings growth model 1.

[21] The p-values for F-tests of the joint significance of all field-of-study coefficients in the presence of controls for occupation and industry transitions are 0.2837 for 1982 graduates, 0.0065 for 1986 graduates, and 0.0006 for 1990 graduates.

6. Concluding Observations

This study uses data from the National Graduates Surveys to investigate empirically the post-graduation earnings growth of Bachelor's level university graduates in Canada for the NGS graduate cohorts of 1982, 1986 and 1990. It formulates and estimates empirical log-earnings growth equations that relate the change in graduates' log-earnings between the second and fifth post-graduation years to two sets of observed covariates: time-invariant baseline characteristics of graduates and their degree programs; and time-varying current characteristics of graduates and their jobs. The time-invariant baseline characteristics include field of study or specialization, age in year of graduation, whether the degree program was a coop program, language first spoken (mother tongue), father's education, and mother's education. The time-varying current characteristics include year 2-to-year 5 transitions in: class of worker status in current job (paid worker or self-employed); full-time/part-time status in current job (or usual weekly hours, available only for the 1986 and 1990 NGS cohorts); temporary/permanent job status; region (province) of residence; marital status; number of dependent children; occupation in current job; and industry of current job.

The primary objective of the paper is to identify the empirical correlates of post-graduation earnings growth in the first five years following graduation. Of the time-invariant baseline characteristics, graduates' field of study in their Bachelor's degree programs is the one for which the estimated earnings growth effects are statistically the strongest and most uniform for both male and female graduates across the three NGS cohorts. Of graduates' time-varying current characteristics, full-time/part-time status (or usual weekly hours of work), occupation and industry yield the strongest evidence of regression-adjusted differences in post-graduation earnings growth for both male and female graduates. For most of the other baseline and current characteristics, the evidence of adjusted earnings growth effects is generally statistically weaker and more variable, both between male and female graduates and across graduate cohorts.

Are the earnings growth effects of graduates' baseline and current characteristics similar or different for male and female graduates? Although we have not undertaken an extensive analysis of this question, our tests for male-female coefficient differences yield two major findings. First, with respect to the earnings growth effects of graduates' time-invariant baseline characteristics,

we find almost no evidence of male-female differences for any of the three graduate cohorts. Second, with respect to the earnings growth effects of graduates' time-varying current characteristics, we find fairly strong evidence of male-female differences for the 1986 and 1990 NGS cohorts, but not for the 1982 cohort. The apparent absence of male-female coefficient differences for the 1982 cohort suggests that the difference between male and female graduates' log-earnings growth rates is attributable to male-female differences in their baseline and current characteristics, not to male-female differences in the earnings growth effects of these characteristics.

A major purpose of the current research is to assess empirically whether graduates' field of study is associated with discernible differences in their post-graduation earnings growth. Our findings respecting the effects of field of study on earnings growth differ depending on whether and how we control for the earnings growth effects of other measured covariates. In the absence of controls for any other covariates of earnings growth, we find strong evidence of regression-unadjusted differences in log-earnings growth rates across fields of study for both males and females in all three graduate cohorts. But in the presence of controls for other covariates, our findings respecting the regression-adjusted earnings growth effects of field of study differ substantially depending on whether or not controls for occupation and industry transitions are included in the estimated log-earnings growth equations. When controls for occupation and industry transitions are excluded from the set of conditioning variables, we find strong evidence of regression-adjusted differences in log-earnings growth rates across field of study. However, when controls for occupation and industry transitions are added to the set of conditioning variables, the evidence of regression-adjusted field-of-study differences in log-earnings growth rates becomes statistically weaker and more variable across cohorts. In other words, our findings respecting the regression-adjusted earnings growth effects of field of study are not statistically robust to the inclusion of controls for year 2-to-year 5 transitions in occupation and industry.

Another question of central interest is whether the earnings growth effects of field of study (i.e., the field of study coefficients in log-earnings growth equations) are different between male and female graduates. Our evidence on this question is quite unambiguous: we find no evidence of male-female differences in either the regression-adjusted or regression-unadjusted effects of field of study on post-graduation log-earnings growth rates. Although the implications of this finding

warrant more thorough empirical investigation than we have undertaken, we would tentatively conclude that male-female differences in post-graduation earnings growth are probably not attributable to male-female differences in the earnings growth effects of field of study. However, differences between the field of study distributions of male and female graduates could still play a role in explaining male-female differences in mean log-earnings growth.

The empirical evidence reported in this paper is provisional in nature, and is intended to provide a benchmark for further research on the post-graduation earnings growth of Canadian university graduates. There are several ways in which the analysis might usefully be extended and refined. First, for reasons relating to statistical precision and robustness, it might be instructive to compute various restricted versions of the log-earnings growth equations we have estimated; these would incorporate more parsimonious specifications of the year 2-to-year 5 transitions in the time-varying current characteristics of graduates, such as marital status, region of residence, occupation and industry. Second, it would be useful to extend the scope of our analysis of post-graduation earnings growth to university graduates other than Bachelor's level graduates, such as those with second professional degrees, Master's degrees, and earned doctorates. Third, the empirical relationship between earnings growth and hours of work probably warrants a more detailed and refined analysis than it has received in this paper. Finally, from the sort of exploratory statistical analysis we have undertaken, it is often difficult to arrive at compact yet accurate characterizations of the evidence on fundamental questions such as "What accounts for the differences in average post-graduation earnings growth between male and female graduates?" One possible way to approach this question would be to conduct a Oaxaca-type decomposition analysis of the male-female difference in mean log-earnings growth rates for each graduate cohort. The purpose of such a decomposition analysis is to partition the difference in mean earnings growth between male and female graduates into two additive components: one that is accounted for by differences in the observed characteristics of male and female graduates; and a second that is accounted for by differences between the coefficient estimates of the male and female earnings growth equations. Although there is no guarantee that such an analysis will yield clear answers to important questions such as the one above, it has proven useful in previous work on differences in earnings levels between male and female graduates (Finnie and Wannell, 1999).

Appendix

Table A-1: Definitions of Regressors in Earnings Growth Equations

Time-Invariant Regressors: Baseline Characteristics

Sex	
Female	= 1 if individual is female
Male	= 1 if individual is male
Age in year of graduation	
Age	= age (in years) in year of graduation
Age-squared	= age squared
Major field of study	
None	= 1 if no field of specialization
Elementary/Secondary	= 1 if elementary/secondary teaching
Other Education	= 1 if other education
Fine Arts and Humanities	= 1 if fine arts and humanities
Commerce	= 1 if commerce
Economics	= 1 if economics
Law	= 1 if law (including jurisprudence).
Social Sciences	= 1 if general social sciences (excluding economics) **(base group)**
Agricultural & Biological Sciences	= 1 if agricultural and biological sciences
Veterinary Sciences	= 1 if veterinary sciences
Engineering	= 1 if engineering
Medical Professions	= 1 if medical professions (doctors, dentists, pharmacists, etc.)
Other Health Professions	= 1 if other health professions (nurses, other health professionals)
Computer Sciences	= 1 if computer sciences
Mathematics & Physical Sciences	= 1 if mathematics and physical sciences
Coop program	
Coop	= 1 if individual's degree program was a coop program
Language first spoken (mother tongue)	
English	= 1 if language first spoken is English **(base group)**
French	= 1 if language first spoken is French
Other	= 1 if language first spoken is neither English nor French
Father's education: father's highest level of completed education	
Dad None	= 1 if father had no formal education
Dad Elementary	= 1 if father had completed elementary school **(base group)**
Dad Secondary	= 1 if father had completed secondary school
Dad College	= 1 if father had a college diploma or certificate
Dad University	= 1 if father had a university degree
Mother's education: mother's highest level of completed education	
Mom None	= 1 if mother had no formal education
Mom Elementary	= 1 if mother had primary education **(base group)**

Mom Secondary	= 1 if mother had completed secondary school
Mom College	= 1 if mother had a college diploma or certificate
Mom University	= 1 if mother had a university degree

Time-Varying Regressors: Current Worker and Job Characteristics

Class of worker

Paid-Paid	= 1 if individual was a paid employee in year 2 and year 5 **(base group)**
Self-Self	= 1 if individual was self-employed in year 2 and year 5
Self-Paid	= 1 if individual was self-employed in year 2 and paid employee in year 5
Paid-Self	= 1 if individual was a paid employee in year 2 and self-employed in year 5

Full-time/part-time status

Full-Full	= 1 if full-time in year 2 and year 5 **(base group)**
Part-Part	= 1 if part-time in year 2 and year 5
Part-Full	= 1 if part-time in year 2 and full-time in year 5
Full-Part	= 1 if full-time in year 2 and part-time in year 5

Temporary/permanent job status

Perm-Perm	= 1 if individual's job was permanent in year 2 and year 5 **(base group)**
Perm-Temp	= 1 if individual's job was permanent in year 2 and temporary in year 5
Temp-Perm	= 1 if individual's job was temporary in year 2 and permanent in year 5
Temp-Temp	= 1 if individual's job was temporary in year 2 and year 5
TmPrunkn	= 1 if individual's job status was unknown in year 2 and/or year 5

Usual hours worked per week – *Continuous specification*

H_{t+2}	= usual weekly hours in year 2
H_{t+2}-squared	= the square of H_{t+2}, usual weekly hours in year 2
H_{t+2}-cubed	= the cube of H_{t+2}, usual weekly hours in year 2
ΔH_{t+5}	= usual weekly hours in year 5 (H_{t+5}) – usual weekly hours in year 2 (H_{t+2})
$H_{t+2}{}^{*}\Delta H_{t+5}$	= the product of usual weekly hours in year 2 (H) and the change in usual weekly hours between year 2 and year 5 (ΔH)

Usual hours worked per week – *Categorical specification*

Less than 20 both years	= 1 if usual weekly hours less than 20 in year 2 and year 5
20-29 both years	= 1 if usual weekly hours was 20-29 in year 2 and year 5
30-34 both years	= 1 if usual weekly hours was 30-34 in year 2 and year 5
35-39 both years	= 1 if usual weekly hours was 35-39 in year 2 and year 5
40 both years	= 1 if usual weekly hours was 40 in year 2 and year 5 **(base group)**
41-45 both years	= 1 if usual weekly hours was 41-45 in year 2 and year 5
45-49 both years	= 1 if usual weekly hours was 45-49 in year 2 and year 5
50 or more both years	= 1 if usual weekly hours was 50 or more in year 2 and year 5
Increased hours	= 1 if usual weekly hours in year 5 greater than usual weekly hours in year 2
Decreased hours	= 1 if usual weekly hours in year 5 less than usual weekly hours in year 2

Region of residence

Atlantic both years	= 1 if individual lived in Atlantic Provinces in year 2 and year 5
Quebec both years	= 1 if individual lived in Quebec in year 2 and year 5
Ontario both years	= 1 if individual lived in Ontario in year 2 and year 5 **(base group)**
Man-Sask both years	= 1 if individual lived in Manitoba or Saskatchewan in year 2 and year 5

Alberta both years	= 1 if individual lived in Alberta in year 2 and year 5
BC both years	= 1 if individual lived in British Columbia or the territories in year 2 and year 5
To Atlantic	= 1 if individual lived in Atlantic Provinces in year 5, elsewhere in year 2
To Quebec	= 1 if individual lived in Quebec in year 5, elsewhere in year 2
To Ontario	= 1 if individual lived in Ontario in year 5, elsewhere in year 2
To Man-Sask	= 1 if individual lived in Manitoba or Saskatchewan in year 5, elsewhere in year 2
To Alberta	= 1 if individual lived in Alberta in year 5, elsewhere in year 2
To BC	= 1 if individual lived in British Columbia or the territories in year 5, elsewhere in year 2

Marital status

Single both years	= 1 if single never married in years 2 and 5 **(base group)**
Married both years	= 1 if married in years 2 and 5
Other both years	= 1 if widowed/separated/divorced in years 2 and 5
Single to Married	= 1 if single never married in year 2 and married in year 5
Single to Other	= 1 if single never married in year 2 and widowed/separated/divorced in year 5
Married to Single	= 1 if married in year 2 and single in year 5.
Married to Other	= 1 if married in year 2 and widowed/separated/divorced in year 5
Other to Single	= 1 if widowed/separated/divorced in year 2 and single in year 5.
Other to Married	= 1 if widowed/separated/divorced in year 2 and married in year 5

Number of children

No children both years	= 1 if no dependent children in years 2 and 5 **(base group)**
Children both years	= 1 if one or more dependent children in years 2 and 5
No children to Children	= 1 if no dependent children in year 2, one or more children in year 5
Children to No children	= 1 if one or more dependent children in year 2, no children in year 5

Industry

Primary both years	= 1 if employed in primary industries in years 2 and 5.
Manufacturing/low tech both years	= 1 if employed in low tech manufacturing in years 2 and 5.
Manufacturing/med tech both years	= 1 if employed in medium tech manufacturing in years 2 and 5
Manufacturing/high tech both years	= 1 if employed in high tech manufacturing in years 2 and 5.
ConsTranCommUtils both years	= 1 if employed in construction, transportation, communication or utilities in years 2 and 5
Wholesale both years	= 1 if employed in wholesale trade in years 2 and 5
Retail both years	= 1 if employed in retail trade in years 2 and 5 **(base group)**
Fin/Ins/RE both years	= 1 if employed in finance, insurance or real estate in years 2 and 5
Business Services both years	= 1 if employed in business services in years 2 and 5
Government Services both years	= 1 if employed in government services in years 2 and 5
Education Services both years	= 1 if employed in education services in years 2 and 5
Health Services both years	= 1 if employed in health services in years 2 and 5
Personal Services both years	= 1 if employed in personal services in years 2 and 5
To Primary	= 1 if employed in primary industries in year 5 but not year 2
To Manufacturing, low tech	= 1 if employed in low tech manufacturing in year 5 but not year 2
To Manufacturing, medium tech	= 1 if employed in medium tech manufacturing in year 5 but not year 2
To Manufacturing, high tech	= 1 if employed in high tech manufacturing in year 5 but not year 2
To Cons/Trans/Comm/Utilities	= 1 if employed in construction, transportation, communication or utilities in year 5 but not year 2

To Wholesale	= 1 if employed in wholesale trade in year 5 but not year 2
To Retail	= 1 if employed in retail trade in year 5 but not year 2 **(base group)**
To Finance/Insurance/ RealEstate	= 1 if employed in finance, insurance or real estate in year 5 but not year 2
To Business Services	= 1 if employed in business services in year 5 but not year 2
To Government Services	= 1 if employed in government services in year 5 but not year 2
To Education Services	= 1 if employed in education services in year 5 but not year 2
To Health Services	= 1 if employed in health services in year 5 but not year 2
To Personal Services	= 1 if employed in personal services in year 5 but not year 2
Occupation	
Management both years	= 1 if occupation was management in years 2 and 5
Management related both years	= 1 if occupation was management related in years 2 and 5
Physical/Biological Sciences both years	= 1 if occupation was physical and biological sciences in years 2 and 5
Architecture/Engineering both years	= 1 if occupation was architecture and engineering in years 2 and 5
Math/Computer Science both years	= 1 if occupation was mathematics and computer science in years 2 and 5
Sociology/Religion both years	= 1 if occupation was sociology and religion in years 2 and 5
Post-Secondary Teaching both years	= 1 if occupation was university and college teaching in years 2 and 5
Elementary/Secondary Teaching both years	= 1 if occupation was elementary and secondary teaching in years 2 and 5
Health Diagnostic Professions both years	= 1 if occupation was health diagnostic professions in years 2 and 5
Other Health Occupations both years	= 1 if occupation was other health occupations in years 2 and 5
Arts/Recreation both years	= 1 if occupation was arts and recreation in years 2 and 5
Clerical both years	= 1 if occupation was clerical in years 2 and 5. **(base group)**
Sales both years	= 1 if occupation was sales in years 2 and 5
Services both years	= 1 if occupation was services in years 2 and 5
Production both years	= 1 if occupation was production work in years 2 and 5
To Management	= 1 if occupation was management in year 5 but not year 2
To Management related	= 1 if occupation was management related in year 5 but not year 2
To Physical/Biological Sciences	= 1 if occupation was physical and biological sciences in year 5 but not year 2
To Architecture/Engineering	= 1 if occupation was architecture and engineering in year 5 but not year 2
To Mathematics/Computer Science	= 1 if occupation was mathematics and computer science in year 5 but not year 2
To Sociology/Religion	= 1 if occupation was sociology and religion in year 5 but not year 2
To Post-Secondary Teaching	= 1 if occupation was university and college teaching in year 5 but not year 2
To Elementary/Secondary Teaching	= 1 if occupation was elementary and secondary teaching in year 5 but not year 2
To Health Diagnostic Professions	= 1 if occupation was health diagnostic professions in year 5 but not year 2
To Other Health Occupations	= 1 if occupation was other health occupations in year 5 but not year 2

To Arts/Recreation	= 1 if occupation was arts and recreation in year 5 but not year 2
To Clerical	= 1 if occupation was clerical in year 5 but not year 2
To Sales	= 1 if occupation was sales in year 5 but not year 2
To Services	= 1 if occupation was services in year 5 but not year 2
To Production	= 1 if occupation was production work in year 5 but not year 2

Notes: All indicator variables are defined to equal zero if stated condition is not satisfied.

Table B-1: **Estimates of Log-Earnings Growth Equation for Male and Female Graduates, 1982 NGS Cohort, Model 1A, Occupation and Industry Excluded**

	Men		*Women*	
Explanatory Variables	Coefficient estimates	(t-ratios)	Coefficient estimates	(t-ratios)
Field of Study				
No field of specialization	-0.095	-2.05	0.003	0.04
Elementary/secondary teaching	-0.124	-2.67	-0.040	-0.95
Other education	-0.014	-0.28	-0.061	-0.95
Fine arts and humanities	0.016	0.34	-0.052	-0.90
Commerce	0.058	1.81	0.044	1.12
Economics	0.111	1.74	-0.104	-1.56
Law	0.237	2.53	0.153	2.07
Social sciences (except Economics)	**Reference**			
Agricultural and biological sciences	-0.054	-1.02	0.018	0.36
Veterinary sciences	-0.030	-0.23	-0.123	-1.16
Engineering	-0.040	-1.39	-0.012	-0.19
Medical professions (doctors, etc.)	0.085	1.16	0.240	2.38
Other health professions (nurses, etc.)	-0.100	-1.50	-0.104	-2.88
Computer sciences	-0.037	-1.11	-0.036	-0.72
Mathematical and physical sciences	-0.019	-0.48	-0.041	-0.89
Age in year of graduation				
Age	0.052	0.76	-0.175	-2.11
Age-squared	-0.001	-0.81	0.003	1.88
Coop program	-0.016	-0.68	0.028	0.87
Language first spoken				
English	**Reference**			
French	0.029	0.93	0.010	0.21
Neither English nor French	0.031	0.87	0.093	2.45
Father's education				
No formal education	-0.110	-0.84	0.016	0.18
Elementary education	**Reference**			
Secondary education	0.028	1.05	0.061	1.29
College/technical certificate or diploma	0.028	1.00	0.010	0.20
University degree (one or more)	0.032	0.80	0.016	0.26
Mother's education				
No formal education	-0.025	-0.16	-0.103	-1.42
Elementary education	**Reference**			
Secondary education	-0.008	-0.30	-0.089	-2.01
College/technical certificate or diploma	0.021	0.53	-0.047	-0.97
University degree (one or more)	-0.007	-0.23	-0.010	-0.28
Class of worker				
Paid employee year 2, Paid employee year 5	**Reference**			
Self-employed year 2, Paid employee year 5	0.056	0.24	-0.061	-0.41
Paid employee year 2, Self-employed year 5	0.379	2.64	0.061	0.30

Self-employed year 2, Self-employed year 5	0.102	1.40	0.131	1.02
Full-time/part-time status				
Full-time year 2, Full-time year 5	**Reference**			
Part-time year 2, Full-time year 5	0.200	2.55	0.425	5.77
Full-time year 2, Part-time year 5	-0.294	-2.00	-0.417	-6.47
Part-time year 2, Part-time year 5	0.218	1.47	-0.094	-1.13
Temporary/permanent job				
Permanent job year 2, Permanent job year 5	**Reference**			
Temporary job year 2, Permanent job year 5	0.073	2.49	-0.023	-0.51
Permanent job year 5, Temporary job year 5	-0.182	-1.62	-0.208	-2.53
Temporary job year 2, Temporary job year 5	0.018	0.25	0.041	0.61
Temporary / Permanent Status Unknown	-0.233	-1.77	-0.010	-0.06
Marital status				
Single year 2, Single year 5	**Reference**			
Single year 2, Married year 5	-0.003	-0.15	-0.034	-1.06
Single year 2, Other year 5	-0.439	-1.98	0.261	1.36
Married year 2, Married year 5	-0.017	-0.66	-0.005	-0.17
Married year 2, Other year 5	-0.035	-0.46	0.142	1.89
Other year 2, Married year 5	0.110	1.05	-0.116	-0.58
Other year 2, Other year 5	0.044	0.30	0.164	1.73
Presence of children				
No child year 2, No child year 5	**Reference**			
No child year 2, Children year 5	0.015	0.63	-0.013	-0.34
Children year 2, No child year 5	0.071	0.35	-0.315	-1.11
Children year 2, Children year 5	0.008	0.16	0.106	1.66
Region of residence				
Atlantic Provinces, both years	-0.037	-1.11	-0.074	-2.24
Quebec, both years	-0.018	-0.57	-0.023	-0.47
Ontario, both years	**Reference**			
Manitoba/Saskatchewan, both years	-0.043	-1.11	-0.056	-1.43
Alberta, both years	-0.111	-3.92	-0.050	-1.35
British Columbia, both years	-0.025	-0.57	-0.076	-1.61
To Atlantic Provinces, year 5	0.022	0.17	-0.099	-0.60
To Quebec, year 5	-0.098	-2.19	-0.145	-1.00
To Ontario, year 5	-0.126	-2.27	-0.056	-0.71
To Manitoba/Saskatchewan, year 5	-0.150	-2.03	-0.174	-0.81
To Alberta, year 5	0.126	0.95	0.149	2.20
To British Columbia, year 5	0.025	0.27	-0.171	-1.04
Constant	**-0.380**	**-0.44**	**2.621**	**2.55**
Number of observations	1820		1647	
R-squared (unadjusted)	0.114		0.235	
F-statistic (p-value)	0.000		0.000	

Notes: The OLS coefficient estimates are weighted by the sampling weights for year 5. The t-ratios given in parentheses are computed using White's (1980) heteroskedasticity robust estimates of the coefficient covariance matrix.

Table B-1a: **Estimates of Log-Earnings Growth Equation for Male and Female Graduates, 1982 NGS Cohort, Model 1B, Occupation and Industry Included**

	Men		*Women*	
Explanatory Variables	Coefficient estimates	(t-ratios)	Coefficient estimates	(t-ratios)
Field of Study				
No field of specialization	-0.070	-1.37	0.021	0.28
Elementary/secondary teaching	-0.092	-1.74	-0.002	-0.05
Other education	-0.016	-0.30	-0.023	-0.36
Fine arts and humanities	0.013	0.29	-0.039	-0.80
Commerce	0.006	0.15	0.030	0.72
Economics	0.075	1.20	-0.136	-1.97
Law	0.212	1.46	0.067	0.84
Social sciences (except Economics)	**Reference**			
Agricultural and biological sciences	-0.087	-1.59	0.024	0.45
Veterinary sciences	-0.023	-0.17	-0.140	-1.29
Engineering	-0.046	-1.30	-0.038	-0.46
Medical professions (doctors, etc.)	-0.097	-0.45	0.179	1.57
Other health professions (nurses, etc.)	-0.089	-0.98	-0.083	-1.44
Computer sciences	-0.025	-0.57	-0.068	-1.04
Mathematical and physical sciences	-0.030	-0.72	-0.059	-1.23
Age in year of graduation				
Age	0.033	0.49	-0.160	-2.19
Age-squared	-0.001	-0.51	0.003	1.95
Coop program	-0.020	-0.83	0.018	0.56
Language first spoken				
English	**Reference**			
French	0.012	0.39	-0.005	-0.11
Neither English nor French	0.033	0.96	0.091	2.63
Father's education				
No formal education	-0.138	-1.21	0.035	0.40
Elementary education	**Reference**			
Secondary education	0.031	1.19	0.014	0.48
College/technical certificate or diploma	0.030	1.07	-0.023	-0.56
University degree (one or more)	0.011	0.31	-0.025	-0.49
Mother's education				
No formal education	-0.002	-0.01	-0.218	-2.51
Elementary education	**Reference**			
Secondary education	-0.014	-0.54	-0.050	-1.61
College/technical certificate or diploma	-0.004	-0.13	-0.018	-0.41
University degree (one or more)	-0.010	-0.33	0.017	0.48
Class of worker				
Paid employee year 2, Paid employee year 5	**Reference**			
Self-employed year 2, Paid employee year 5	0.065	0.33	-0.038	-0.22
Paid employee year 2, Self-employed year 5	0.376	2.65	0.089	0.41

Self-employed year 2, Self-employed year 5	0.113	1.51	0.117	0.88
Full-time/part-time status				
Full-time year 2, Full-time year 5	**Reference**			
Part-time year 2, Full-time year 5	0.201	2.63	0.419	6.32
Full-time year 2, Part-time year 5	-0.312	-2.19	-0.418	-6.55
Part-time year 2, Part-time year 5	0.188	1.23	-0.083	-0.95
Temporary/permanent job				
Permanent job year 2, Permanent job year 5	**Reference**			
Temporary job year 2, Permanent job year 5	0.078	2.60	0.020	0.61
Permanent job year 5, Temporary job year 5	-0.169	-1.66	-0.239	-2.96
Temporary job year 2, Temporary job year 5	-0.012	-0.17	0.007	0.10
Temporary / Permanent Status Unknown	-0.201	-1.54	-0.025	-0.13
Marital status				
Single year 2, Single year 5	**Reference**			
Single year 2, Married year 5	-0.005	-0.22	-0.034	-1.22
Single year 2, Other year 5	-0.388	-1.80	0.310	1.36
Married year 2, Married year 5	-0.017	-0.63	-0.019	-0.66
Married year 2, Other year 5	-0.044	-0.59	0.126	1.81
Other year 2, Married year 5	0.077	0.68	-0.155	-0.68
Other year 2, Other year 5	0.054	0.37	0.199	1.91
Presence of children				
No child year 2, No child year 5	**Reference**			
No child year 2, Children year 5	0.017	0.69	-0.011	-0.29
Children year 2, No child year 5	0.027	0.13	-0.277	-0.90
Children year 2, Children year 5	-0.007	-0.16	0.098	1.57
Region of residence				
Atlantic Provinces, both years	-0.029	-0.89	-0.051	-1.57
Quebec, both years	0.008	0.25	-0.014	-0.31
Ontario, both years	**Reference**			
Manitoba/Saskatchewan, both years	-0.035	-0.95	-0.042	-1.12
Alberta, both years	-0.091	-2.98	-0.040	-1.08
British Columbia, both years	-0.015	-0.35	-0.079	-1.64
To Atlantic Provinces, year 5	0.037	0.28	-0.150	-0.81
To Quebec, year 5	-0.079	-1.44	-0.150	-1.14
To Ontario, year 5	-0.120	-2.22	-0.026	-0.31
To Manitoba/Saskatchewan, year 5	-0.105	-1.46	-0.151	-0.76
To Alberta, year 5	0.160	1.22	0.135	1.61
To British Columbia, year 5	0.048	0.56	-0.173	-1.04
Occupation				
Management, both years	0.118	1.06	0.068	1.21
Management related, both years	0.144	1.28	0.054	1.21
Physical/Biological Sciences, both years	0.058	0.53	0.019	0.25
Architecture/Engineering, both years	0.079	0.70	0.018	0.24
Mathematics/Computer Science, both years	0.080	0.71	0.012	0.22
Sociology/Religion, both years	-0.005	-0.04	0.078	1.47

Post-Secondary Teaching, both years	-0.027	-0.20	-0.002	-0.01
Elementary/Secondary Teaching, both years	0.110	0.96	-0.131	-1.64
Health Diagnostic Professions, both years	0.205	0.86	0.138	1.31
Other Health Occupations, both years	0.004	0.03	0.006	0.09
Arts/Recreation, both years	0.131	0.94	0.169	1.64
Clerical, both years	**Reference**			
Sales, both years	0.171	1.39	-0.055	-0.69
Services, both years	0.029	0.25	-0.063	-0.45
Production, both years	0.103	0.89	0.017	0.16
To Management, year 5	0.147	1.31	0.088	1.77
To Management Related, year 5	0.092	0.76	-0.034	-0.65
To Physical/Biological sciences, year 5	0.004	0.03	-0.165	-1.83
To Architecture/Engineering, year 5	0.128	0.94	0.126	1.56
To Mathematics/Computer Science, year 5	0.129	1.12	0.021	0.31
To Sociology/Religion, year 5	-0.075	-0.52	0.107	1.01
To Post-Secondary Teaching, year 5	-0.007	-0.04	-0.008	-0.05
To Elementary/Secondary teaching, year 5	0.406	2.91	0.142	1.41
To Health Diagnostic Professions, year 5	0.291	1.04	0.032	0.34
To Other Health Occupations, year 5	0.094	0.32	-0.084	-0.67
To Arts/Recreation, year 5	0.032	0.19	-0.177	-1.27
To Clerical, year 5	0.158	1.01	-0.050	-0.59
To Sales, year 5	0.215	1.57	0.126	1.25
To Services, year 5	0.085	0.53	-0.044	-0.38
To Production, year 5	0.110	0.89	0.113	1.11
Industry				
Primary industries, both years	-0.036	-0.48	-0.061	-0.70
Low tech manufacturing, both years	0.110	1.15	-0.033	-0.35
Medium tech manufacturing, both years	-0.010	-0.14	0.002	0.03
High tech manufacturing, both years	-0.030	-0.46	-0.061	-0.93
Construction, transportation, communication and utilities, both years	-0.031	-0.45	0.083	1.30
Wholesale trade, both years	-0.013	-0.17	0.047	0.60
Retail trade, both years	**Reference**			
Finance/Insurance/Real Estate, both years	-0.046	-0.64	0.040	0.71
Business services, both years	0.095	1.41	0.050	0.79
Government services, both years	-0.018	-0.27	-0.043	-0.76
Education services, both years	-0.065	-0.82	0.085	1.01
Health services, both years	0.073	0.86	-0.026	-0.51
Personal services, both years	-0.028	-0.34	-0.092	-0.90
To Primary industries, year 5	0.168	1.10	-0.076	-0.79
To Low tech manufacturing, year 5	0.093	0.58	0.045	0.54
To Medium tech manufacturing, year 5	0.065	0.70	0.113	1.48
To High tech manufacturing, year 5	0.068	0.90	-0.053	-0.48
To Construction, transportation, communication and utilities, year 5	0.156	1.57	0.056	0.55
To Wholesale trade, year 5	-0.058	-0.64	0.003	0.02

To Retail trade, year 5	-0.097	-0.92	0.253	1.46
To Finance, insurance, real estate, year 5	-0.065	-0.68	-0.009	-0.09
To Business services, year 5	-0.126	-1.55	-0.016	-0.19
To Government services, year 5	0.264	2.24	0.097	1.18
To Education services, year 5	-0.196	-1.85	0.080	0.81
To Health services, year 5	0.000	0.00	-0.162	-1.36
To Personal services, year 5	-0.111	-0.82	-0.162	-1.25
Constant	**-0.249**	**-0.30**	**2.430**	**2.64**
Number of observations	1820		1647	
R-squared (unadjusted)	0.177		0.284	
F-statistic (p-value)	0.000		0.000	

Notes: The OLS coefficient estimates are weighted by the sampling weights for year 5. The t-ratios given in parentheses are computed using White's (1980) heteroskedasticity robust estimates of the coefficient covariance matrix.

Table B-2: **Estimates of Log-Earnings Growth Equation for Male and Female Graduates, 1986 NGS Cohort, Model 1A, Occupation and Industry Excluded**

	Men		*Women*	
Explanatory Variables	Coefficient estimates	(t-ratios)	Coefficient estimates	(t-ratios)
Field of Study				
No field of specialization	-0.046	-0.58	0.013	0.25
Elementary/secondary teaching	-0.141	-2.50	-0.076	-1.77
Other education	-0.112	-1.84	-0.077	-1.26
Fine arts and humanities	-0.128	-1.96	-0.080	-1.61
Commerce	-0.031	-0.61	0.000	0.00
Economics	-0.068	-0.88	-0.117	-1.27
Law	0.125	1.94	0.082	1.12
Social sciences (except Economics)	**Reference**			
Agricultural and biological sciences	-0.030	-0.53	-0.054	-1.03
Veterinary sciences	-0.161	-1.63	-0.036	-0.40
Engineering	-0.059	-1.21	-0.077	-1.18
Medical professions (doctors, etc.)	-0.001	-0.01	0.173	2.12
Other health professions (nurses, etc.)	-0.026	-0.31	-0.115	-3.01
Computer sciences	0.015	0.26	0.013	0.23
Mathematical and physical sciences	-0.070	-1.25	-0.091	-1.53
Age in year of graduation				
Age	-0.171	-3.40	-0.057	-0.94
Age-squared	0.003	3.17	0.001	0.94
Coop program	-0.033	-0.92	0.025	0.55
Language first spoken				
English	**Reference**			
French	-0.003	-0.07	-0.012	-0.23
Neither English nor French	-0.017	-0.51	0.061	1.36
Father's education				
No formal education	-0.002	-0.02	0.124	0.56
Elementary education	**Reference**			
Secondary education	-0.014	-0.64	0.003	0.11
College/technical certificate or diploma	0.018	0.50	-0.044	-1.23
University degree (one or more)	-0.005	-0.11	0.075	1.70
Mother's education				
No formal education	-0.151	-0.98	0.048	0.25
Elementary education	**Reference**			
Secondary education	0.054	2.15	0.048	1.58
College/technical certificate or diploma	0.012	0.30	0.076	1.61
University degree (one or more)	0.018	0.62	0.025	0.73
Class of worker				
Paid employee year 2, Paid employee year 5	**Reference**			
Self-employed year 2, Paid employee year 5	0.227	0.70	-0.429	-3.48
Paid employee year 2, Self-employed year 5	0.461	1.88	-0.289	-3.04

Self-employed year 2, Self-employed year 5	0.246	0.96	-0.603	-4.52
Full-time/part-time status				
Full-time year 2, Full-time year 5	**Reference**			
Part-time year 2, Full-time year 5	0.544	4.24	0.409	5.34
Full-time year 2, Part-time year 5	-0.394	-1.90	-0.647	-10.50
Part-time year 2, Part-time year 5	0.040	0.14	0.118	0.91
Temporary/permanent job				
Permanent job year 2, Permanent job year 5	**Reference**			
Temporary job year 2, Permanent job year 5	0.070	1.71	0.082	1.94
Permanent job year 5, Temporary job year 5	-0.022	-0.37	-0.139	-2.18
Temporary job year 2, Temporary job year 5	-0.091	-0.99	0.088	1.20
Temporary / Permanent Status Unknown	-0.337	-1.40	0.416	8.74
Marital status				
Single year 2, Single year 5	**Reference**			
Single year 2, Married year 5	0.013	0.47	-0.015	-0.52
Single year 2, Other year 5	-0.175	-1.09	0.307	1.13
Married year 2, Married year 5	0.037	1.24	-0.071	-2.29
Married year 2, Other year 5	-0.002	-0.05	-0.058	-0.71
Other year 2, Married year 5	0.089	0.59	-0.243	-2.41
Other year 2, Other year 5	0.618	1.67	-0.014	-0.10
Presence of children				
No child year 2, No child year 5	**Reference**			
No child year 2, Children year 5	0.034	1.11	-0.066	-2.11
Children year 2, No child year 5	0.023	0.17	0.084	1.08
Children year 2, Children year 5	0.079	1.91	0.029	0.38
Region of residence				
Atlantic Provinces, both years	-0.124	-3.76	-0.121	-3.76
Quebec, both years	-0.105	-2.16	0.026	0.48
Ontario, both years	**Reference**			
Manitoba/Saskatchewan, both years	-0.100	-2.41	-0.069	-1.74
Alberta, both years	-0.049	-1.86	-0.077	-2.24
British Columbia, both years	-0.016	-0.40	-0.080	-1.88
To Atlantic Provinces, year 5	-0.129	-0.81	-0.230	-2.77
To Quebec, year 5	-0.169	-2.45	-0.155	-3.18
To Ontario, year 5	-0.059	-0.77	0.041	0.59
To Manitoba/Saskatchewan, year 5	-0.173	-1.09	0.150	0.52
To Alberta, year 5	-0.073	-1.01	-0.162	-1.92
To British Columbia, year 5	-0.003	-0.06	-0.014	-0.27
Constant	**2.618**	**3.99**	**0.999**	**1.26**
Number of observations	1717		1736	
R-squared (unadjusted)	0.158		.312	
F-statistic (p-value)	0.000		0.000	

Notes: The OLS coefficient estimates are weighted by the sampling weights for year 5. The t-ratios given in parentheses are computed using White's (1980) heteroskedasticity robust estimates of the coefficient covariance matrix.

Table B-2a: Estimates of Log-Earnings Growth Equation for Male and Female Graduates, 1986 NGS Cohort, Model 1B, Occupation and Industry Included

	Men		*Women*	
Explanatory Variables	Coefficient estimates	(t-ratios)	Coefficient estimates	(t-ratios)
Field of Study				
No field of specialization	-0.105	-1.52	0.004	0.07
Elementary/secondary teaching	-0.096	-1.63	-0.041	-0.71
Other education	-0.080	-1.20	-0.075	-1.23
Fine arts and humanities	-0.122	-1.96	-0.079	-1.67
Commerce	-0.080	-1.65	-0.053	-1.36
Economics	-0.066	-0.89	-0.168	-1.94
Law	0.065	0.82	0.006	0.07
Social sciences (except Economics)	**Reference**			
Agricultural and biological sciences	-0.046	-0.83	-0.059	-1.08
Veterinary sciences	-0.430	-2.54	-0.541	-2.23
Engineering	-0.111	-1.74	-0.071	-0.72
Medical professions (doctors, etc.)	-0.308	-1.88	-0.215	-0.81
Other health professions (nurses, etc.)	-0.024	-0.27	-0.182	-2.81
Computer sciences	-0.030	-0.50	-0.015	-0.20
Mathematical and physical sciences	-0.084	-1.50	-0.086	-1.45
Age in year of graduation				
Age	-0.178	-3.67	-0.045	-0.76
Age-squared	0.003	3.43	0.001	0.76
Coop program	-0.044	-1.29	0.010	0.22
Language first spoken				
English	**Reference**			
French	-0.003	-0.07	0.003	0.06
Neither English nor French	-0.038	-1.31	0.048	1.05
Father's education				
No formal education	0.038	0.31	0.091	0.39
Elementary education	**Reference**			
Secondary education	-0.011	-0.53	-0.002	-0.08
College/technical certificate or diploma	0.017	0.54	-0.050	-1.40
University degree (one or more)	0.016	0.42	0.077	1.90
Mother's education				
No formal education	-0.162	-1.13	0.042	0.22
Elementary education	**Reference**			
Secondary education	0.060	2.50	0.049	1.63
College/technical certificate or diploma	0.018	0.5[illegible]	0.103	2.11
University degree (one or more)	0.011	0.40	0.029	0.87
Class of worker				
Paid employee year 2, Paid employee year 5	**Reference**			
Self-employed year 2, Paid employee year 5	0.403	1.54	-0.349	-2.15
Paid employee year 2, Self-employed year 5	0.453	2.14	-0.206	-1.49

Self-employed year 2, Self-employed year 5	0.242	1.10	-0.548	-3.35
Full-time/part-time status				
Full-time year 2, Full-time year 5	**Reference**			
Part-time year 2, Full-time year 5	0.630	5.75	0.405	6.57
Full-time year 2, Part-time year 5	-0.362	-1.50	-0.626	-10.62
Part-time year 2, Part-time year 5	0.183	0.54	0.133	1.09
Temporary/permanent job				
Permanent job year 2, Permanent job year 5	**Reference**			
Temporary job year 2, Permanent job year 5	0.074	2.04	0.099	2.72
Permanent job year 5, Temporary job year 5	-0.036	-0.62	-0.153	-2.44
Temporary job year 2, Temporary job year 5	-0.106	-1.36	0.052	0.78
Temporary / Permanent Status Unknown	-0.386	-1.91	0.307	2.82
Marital status				
Single year 2, Single year 5	**Reference**			
Single year 2, Married year 5	0.013	0.47	0.011	0.44
Single year 2, Other year 5	-0.117	-0.98	0.305	1.17
Married year 2, Married year 5	0.040	1.42	-0.057	-2.04
Married year 2, Other year 5	-0.014	-0.35	-0.016	-0.20
Other year 2, Married year 5	0.086	0.59	-0.230	-2.09
Other year 2, Other year 5	0.590	1.73	-0.026	-0.20
Presence of children				
No child year 2, No child year 5	**Reference**			
No child year 2, Children year 5	0.019	0.67	-0.083	-2.65
Children year 2, No child year 5	0.083	0.57	0.087	1.03
Children year 2, Children year 5	0.065	1.72	0.039	0.54
Region of residence				
Atlantic Provinces, both years	-0.123	-3.78	-0.135	-4.09
Quebec, both years	-0.105	-2.56	0.008	0.15
Ontario, both years	**Reference**			
Manitoba/Saskatchewan, both years	-0.092	-2.30	-0.072	-1.92
Alberta, both years	-0.040	-1.46	-0.088	-2.76
British Columbia, both years	0.008	0.21	-0.098	-2.30
To Atlantic Provinces, year 5	-0.195	-1.26	-0.214	-2.73
To Quebec, year 5	-0.105	-1.44	-0.125	-1.66
To Ontario, year 5	-0.060	-0.78	0.020	0.34
To Manitoba/Saskatchewan, year 5	-0.158	-0.95	0.131	0.47
To Alberta, year 5	-0.103	-1.43	-0.102	-1.31
To British Columbia, year 5	-0.046	-0.76	-0.063	-1.03
Occupation				
Management, both years	0.148	1.85	-0.036	-0.56
Management related, both years	0.221	2.77	0.094	1.78
Physical/Biological Sciences, both years	0.088	1.04	-0.005	-0.08
Architecture/Engineering, both years	0.159	1.85	-0.036	-0.42
Mathematics/Computer Science, both years	0.122	1.37	-0.033	-0.53
Sociology/Religion, both years	0.087	1.00	0.106	1.46

Post-Secondary Teaching, both years	0.010	0.07	-0.003	-0.02
Elementary/Secondary Teaching, both years	0.161	1.62	-0.067	-0.76
Health Diagnostic Professions, both years	0.518	2.90	0.567	2.20
Other Health Occupations, both years	0.134	1.27	0.207	2.37
Arts/Recreation, both years	0.040	0.38	0.068	0.71
Clerical, both years	**Reference**			
Sales, both years	0.081	1.03	-0.036	-0.41
Services, both years	0.108	1.33	0.024	0.33
Production, both years	0.080	1.03	-0.018	-0.26
To Management, year 5	0.201	2.58	0.108	2.14
To Management Related, year 5	0.095	1.11	0.081	1.47
To Physical/Biological sciences, year 5	0.293	1.94	0.158	0.83
To Architecture/Engineering, year 5	0.066	0.51	-0.066	-0.73
To Mathematics/Computer Science, year 5	0.072	0.73	-0.056	-0.85
To Sociology/Religion, year 5	0.080	0.57	0.084	0.80
To Post-Secondary Teaching, year 5	0.136	0.59	0.155	0.45
To Elementary/Secondary teaching, year 5	0.548	3.38	0.087	1.05
To Health Diagnostic Professions, year 5	0.464	2.81	0.445	1.25
To Other Health Occupations, year 5	-0.530	-1.50	0.395	1.92
To Arts/Recreation, year 5	0.023	0.12	-0.092	-0.96
To Clerical, year 5	0.071	0.72	-0.064	-1.10
To Sales, year 5	-0.021	-0.24	0.051	0.83
To Services, year 5	-0.097	-0.49	-0.615	-2.62
To Production, year 5	0.010	0.11	-0.467	-3.25
Industry				
Primary industries, both years	0.103	1.36	0.140	1.54
Low tech manufacturing, both years	0.307	1.97	0.077	0.88
Medium tech manufacturing, both years	0.151	1.91	0.021	0.22
High tech manufacturing, both years	0.147	1.96	0.058	0.74
Construction, transportation, communication and utilities, both years	0.162	2.12	0.055	0.82
Wholesale trade, both years	0.201	2.68	0.185	1.75
Retail trade, both years	**Reference**			
Finance/Insurance/Real Estate, both years	0.134	1.87	0.073	1.05
Business services, both years	0.260	3.30	0.125	1.65
Government services, both years	0.103	1.46	0.099	1.43
Education services, both years	0.030	0.36	0.084	0.82
Health services, both years	0.168	2.07	-0.095	-1.34
Personal services, both years	0.162	1.66	0.073	0.86
To Primary industries, year 5	0.312	2.58	0.113	1.17
To Low tech manufacturing, year 5	0.087	0.91	0.139	1.29
To Medium tech manufacturing, year 5	0.206	2.28	0.600	2.26
To High tech manufacturing, year 5	0.266	3.26	0.027	0.32
To Construction, transportation, communication and utilities, year 5	0.226	2.87	0.141	1.80
To Wholesale trade, year 5	0.191	2.26	-0.061	-0.50

To Retail trade, year 5	0.129	0.93	-0.099	-0.91
To Finance, insurance, real estate, year 5	0.217	2.55	0.070	0.78
To Business services, year 5	0.101	1.14	0.040	0.39
To Government services, year 5	0.237	2.44	0.085	1.03
To Education services, year 5	-0.139	-1.06	0.133	1.34
To Health services, year 5	0.387	2.23	0.000	0.00
To Personal services, year 5	0.313	2.70	-0.157	-1.46
Constant	**2.434**	**3.82**	**0.760**	**0.98**
Number of observations	1717		1736	
R-squared (unadjusted)	.260		.380	
F-statistic (p-value)	0.000		0.000	

Notes: The OLS coefficient estimates are weighted by the sampling weights for year 5. The t-ratios given in parentheses are computed using White's (1980) heteroskedasticity robust estimates of the coefficient covariance matrix.

Table B-3: **Estimates of Log-Earnings Growth Equation for Male and Female Graduates, 1990 NGS Cohort, Model 1A, Occupation and Industry Excluded**

	Men		*Women*	
Explanatory Variables	Coefficient estimates	(t-ratios)	Coefficient estimates	(t-ratios)
Field of Study				
No field of specialization	-0.108	-1.91	0.136	1.50
Elementary/secondary teaching	-0.064	-0.99	-0.078	-2.07
Other education	-0.038	-0.57	0.005	0.10
Fine arts and humanities	0.107	1.37	0.071	1.21
Commerce	0.020	0 32	-0.012	-0.30
Economics	0 002	0.02	0.035	0.29
Law	-0.067	-0.66	0.022	0.26
Social sciences (except Economics)	**Reference**			
Agricultural and biological sciences	-0.002	-0.02	0.041	0.92
Veterinary sciences	0.041	0.45	0.037	0.34
Engineering	-0.049	-0.85	-0.039	-0.67
Medical professions (doctors, etc.)	0.207	2.04	0.287	3.20
Other health professions (nurses, etc.)	-0.138	-2.25	-0.072	-2.02
Computer sciences	-0.028	-0.46	-0.036	-0.75
Mathematical and physical sciences	0.022	0.37	0.029	0.63
Age in year of graduation				
Age	0.077	1.09	-0.036	-0.43
Age-squared	-0.002	-1.24	0.001	0.35
Coop program	0.007	0.30	0.011	0.30
Language first spoken				
English	**Reference**			
French	-0.117	-2.19	-0.011	-0.35
Neither English nor French	-0.023	-0.61	0.005	0.10
Father's education				
No formal education	-0.087	-0.58	0.317	1.78
Elementary education	**Reference**			
Secondary education	0.035	1.24	0.025	0.77
College/technical certificate or diploma	0.062	1.47	0.017	0.47
University degree (one or more)	0.053	1.20	0.049	1.16
Mother's education				
No formal education	0.119	1.54	-0.046	-0.60
Elementary education	**Reference**			
Secondary education	0.023	0.74	-0.070	-2.06
College/technical certificate or diploma	-0.031	-0.65	-0.079	-1.75
University degree (one or more)	-0.006	-0.15	-0.049	-1.34
Class of worker				
Paid employee year 2, Paid employee year 5	**Reference**			
Self-employed year 2, Paid employee year 5	-0.040	-0.35	-0.146	-1.06
Paid employee year 2, Self-employed year 5	0.162	2.64	0.078	1.07

Self-employed year 2, Self-employed year 5	0.027	0.30	-0.299	-1.85
Full-time/part-time status				
Full-time year 2, Full-time year 5	**Reference**			
Part-time year 2, Full-time year 5	0.385	4.08	0.454	4.61
Full-time year 2, Part-time year 5	-0.826	-3.06	-0.597	-9.48
Part-time year 2, Part-time year 5	-0.195	-1.03	0.005	0.04
Temporary/permanent job				
Permanent job year 2, Permanent job year 5	**Reference**			
Temporary job year 2, Permanent job year 5	0.034	0.74	0.166	3.72
Permanent job year 5, Temporary job year 5	-0.117	-1.74	-0.164	-1.84
Temporary job year 2, Temporary job year 5	-0.081	-0.59	0.100	1.46
Temporary / Permanent Status Unknown	-0.058	-0.38	0.317	2.51
Marital status				
Single year 2, Single year 5	**Reference**			
Single year 2, Married year 5	-0.005	-0.15	0.019	0.58
Single year 2, Other year 5	0.012	0.15	-0.035	-0.61
Married year 2, Married year 5	0.004	0.12	-0.025	-0.77
Married year 2, Other year 5	0.029	0.50	-0.070	-1.37
Other year 2, Married year 5	-0.047	-0.42	0.331	2.39
Other year 2, Other year 5	1.099	3.71	0.033	0.19
Presence of children				
No child year 2, No child year 5	**Reference**			
No child year 2, Children year 5	0.041	1.13	-0.078	-2.09
Children year 2, No child year 5	-0.331	-1.72	0.033	0.53
Children year 2, Children year 5	-0.019	-0.43	-0.069	-1.56
Region of residence				
Atlantic Provinces, both years	0.010	0.25	0.026	0.50
Quebec, both years	0.096	1.58	0.022	0.64
Ontario, both years	**Reference**			
Manitoba/Saskatchewan, both years	0.082	1.80	0.039	1.01
Alberta, both years	0.090	2.43	0.039	1.00
British Columbia, both years	0.081	1.89	0.037	0.98
To Atlantic Provinces, year 5	0.076	0.91	-0.048	-0.59
To Quebec, year 5	0.004	0.04	-0.048	-0.46
To Ontario, year 5	0.164	1.86	0.145	1.54
To Manitoba/Saskatchewan, year 5	-0.214	-0.99	-0.025	-0.19
To Alberta, year 5	0.019	0.28	-0.088	-0.46
To British Columbia, year 5	0.190	1.66	0.482	1.63
Constant	**-0.732**	**-0.79**	**0.701**	**0.66**
Number of observations	1741		1776	
R-squared (unadjusted)	.162		.259	
F-statistic (p-value)	0.000		0.000	

Notes: The OLS coefficient estimates are weighted by the sampling weights for year 5. The t-ratios given in parentheses are computed using White's (1980) heteroskedasticity robust estimates of the coefficient covariance matrix.

Table B-3a: **Estimates of Log-Earnings Growth Equation for Male and Female Graduates, 1990 NGS Cohort, Model 1B, Occupation and Industry Included**

	Men		*Women*	
Explanatory Variables	Coefficient estimates	(t-ratios)	Coefficient estimates	(t-ratios)
Field of Study				
No field of specialization	-0.123	-2.11	0.095	1.11
Elementary/secondary teaching	-0.071	-0.84	-0.050	-1.11
Other education	-0.042	-0.62	-0.006	-0.11
Fine arts and humanities	0.125	1.54	0.042	0.78
Commerce	-0.021	-0.35	-0.050	-1.21
Economics	-0.023	-0.29	-0.029	-0.36
Law	-0.124	-1.07	-0.036	-0.41
Social sciences (except Economics)	**Reference**			
Agricultural and biological sciences	-0.033	-0.45	0.002	0.05
Veterinary sciences	-0.098	-0.81	0.097	0.61
Engineering	-0.071	-1.08	-0.047	-0.76
Medical professions (doctors, etc.)	0.176	1.23	0.370	2.29
Other health professions (nurses, etc.)	-0.215	-2.85	-0.127	-2.05
Computer sciences	-0.066	-0.94	-0.043	-0.69
Mathematical and physical sciences	0.006	0.10	0.019	0.36
Age in year of graduation				
Age	0.107	1.53	-0.043	-0.55
Age-squared	-0.002	-1.66	0.001	0.50
Coop program	-0.015	-0.65	-0.024	-0.63
Language first spoken				
English	**Reference**			
French	-0.096	-2.01	0.021	0.67
Neither English nor French	-0.010	-0.31	-0.009	-0.18
Father's education				
No formal education	-0.146	-1.07	0.377	2.23
Elementary education	**Reference**			
Secondary education	0.036	1.34	0.014	0.48
College/technical certificate or diploma	0.061	1.65	0.000	-0.01
University degree (one or more)	0.055	1.31	0.019	0.47
Mother's education				
No formal education	0.070	0.94	-0.149	-1.56
Elementary education	**Reference**			
Secondary education	0.024	0.83	-0.068	-2.19
College/technical certificate or diploma	-0.036	-0.77	-0.068	-1.56
University degree (one or more)	-0.013	-0.33	-0.028	-0.81
Class of worker				
Paid employee year 2, Paid employee year 5	**Reference**			
Self-employed year 2, Paid employee year 5	-0.074	-0.65	-0.142	-1.07
Paid employee year 2, Self-employed year 5	0.152	2.46	0.066	0.84

Self-employed year 2, Self-employed year 5	0.013	0.17	-0.304	-1.84
Full-time/part-time status				
Full-time year 2, Full-time year 5	**Reference**			
Part-time year 2, Full-time year 5	0.397	4.50	0.446	5.42
Full-time year 2, Part-time year 5	-0.761	-3.66	-0.617	-9.95
Part-time year 2, Part-time year 5	-0.176	-0.91	-0.043	-0.36
Temporary/permanent job				
Permanent job year 2, Permanent job year 5	**Reference**			
Temporary job year 2, Permanent job year 5	0.036	0.76	0.146	3.69
Permanent job year 5, Temporary job year 5	-0.141	-2.32	-0.213	-2.78
Temporary job year 2, Temporary job year 5	-0.086	-0.66	0.048	0.82
Temporary / Permanent Status Unknown	-0.056	-0.43	0.317	2.11
Marital status				
Single year 2, Single year 5	**Reference**			
Single year 2, Married year 5	-0.012	-0.35	0.010	0.34
Single year 2, Other year 5	-0.019	-0.32	0.108	1.34
Married year 2, Married year 5	0.000	-0.01	-0.028	-0.94
Married year 2, Other year 5	0.035	0.55	-0.085	-1.50
Other year 2, Married year 5	-0.069	-0.57	0.303	2.51
Other year 2, Other year 5	1.067	4.64	0.003	0.02
Presence of children				
No child year 2, No child year 5	**Reference**			
No child year 2, Children year 5	0.034	1.04	-0.060	-1.78
Children year 2, No child year 5	-0.404	-1.94	-0.022	-0.35
Children year 2, Children year 5	-0.018	-0.44	-0.073	-1.75
Region of residence				
Atlantic Provinces, both years	0.019	0.50	0.000	-0.01
Quebec, both years	0.102	1.86	0.002	0.05
Ontario, both years	**Reference**			
Manitoba/Saskatchewan, both years	0.098	2.12	0.012	0.33
Alberta, both years	0.080	2.07	0.031	0.84
British Columbia, both years	0.082	1.90	0.055	1.47
To Atlantic Provinces, year 5	0.067	0.82	-0.047	-0.61
To Quebec, year 5	0.054	0.70	-0.125	-1.73
To Ontario, year 5	0.169	2.08	0.104	1.26
To Manitoba/Saskatchewan, year 5	-0.207	-0.96	-0.031	-0.24
To Alberta, year 5	0.019	0.23	-0.129	-0.76
To British Columbia, year 5	0.187	1.81	0.442	1.69
Occupation				
Management, both years	0.168	1.34	0.003	0.07
Management related, both years	0.155	1.29	0.040	0.80
Physical/Biological Sciences, both years	0.058	0.51	-0.097	-1.54
Architecture/Engineering, both years	0.120	1.06	-0.080	-0.88
Mathematics/Computer Science, both years	0.148	1.34	0.019	0.24
Sociology/Religion, both years	0.132	1.06	-0.011	-0.19

Post-Secondary Teaching, both years	-0.293	-1.05	-0.334	-1.59
Elementary/Secondary Teaching, both years	0.076	0.64	-0.083	-1.32
Health Diagnostic Professions, both years	0.199	1.11	-0.067	-0.44
Other Health Occupations, both years	0.277	2.21	0.077	1.17
Arts/Recreation, both years	0.100	0.75	0.018	0.20
Clerical, both years	**Reference**			
Sales, both years	0.203	1.49	-0.181	-1.39
Services, both years	0.226	1.64	0.176	1.97
Production, both years	0.165	1.11	0.037	0.60
To Management, year 5	0.228	2.00	0.052	0.91
To Management Related, year 5	0.195	1.67	-0.023	-0.29
To Physical/Biological sciences, year 5	0.069	0.62	0.011	0.07
To Architecture/Engineering, year 5	0.122	1.05	0.019	0.24
To Mathematics/Computer Science, year 5	0.142	0.97	0.122	1.37
To Sociology/Religion, year 5	-0.121	-0.74	0.006	0.06
To Post-Secondary Teaching, year 5	0.241	0.86	-0.449	-2.77
To Elementary/Secondary teaching, year 5	0.209	0.68	0.402	2.30
To Health Diagnostic Professions, year 5	0.763	1.91	-0.239	-1.07
To Other Health Occupations, year 5	0.048	0.39	0.287	1.38
To Arts/Recreation, year 5	-0.047	-0.32	0.231	1.20
To Clerical, year 5	0.301	1.72	0.048	0.27
To Sales, year 5	0.212	1.58	0.003	0.04
To Services, year 5	0.244	1.34	-0.335	-2.21
To Production, year 5	-0.033	-0.23	-0.272	-1.01
Industry				
Primary industries, both years	0.092	0.83	0.001	0.01
Low tech manufacturing, both years	-0.125	-1.26	-0.063	-0.83
Medium tech manufacturing, both years	0.008	0.09	0.114	1.72
High tech manufacturing, both years	-0.006	-0.10	0.144	2.75
Construction, transportation, communication and utilities, both years	-0.038	-0.47	0.033	0.45
Wholesale trade, both years	-0.226	-1.72	0.039	0.56
Retail trade, both years	**Reference**			
Finance/Insurance/Real Estate, both years	-0.073	-0.98	0.078	1.64
Business services, both years	0.062	0.82	0.129	1.97
Government services, both years	-0.083	-1.09	-0.079	-1.52
Education services, both years	0.033	0.35	0.069	1.20
Health services, both years	-0.084	-1.08	0.018	0.42
Personal services, both years	-0.027	-0.26	0.106	1.68
To Primary industries, year 5	0.329	2.83	0.173	0.98
To Low tech manufacturing, year 5	-0.061	-0.46	-0.128	-0.77
To Medium tech manufacturing, year 5	0.024	0.12	-0.028	-0.27
To High tech manufacturing, year 5	0.126	1.35	0.438	1.98
To Construction, transportation, communication and utilities, year 5	0.064	0.50	0.253	1.28
To Wholesale trade, year 5	-0.039	-0.29	0.337	3.22

To Retail trade, year 5	-0.271	-1.86	-0.267	-1.73
To Finance, insurance, real estate, year 5	-0.003	-0.03	0.226	1.88
To Business services, year 5	-0.004	-0.05	-0.089	-0.57
To Government services, year 5	0.212	1.83	0.035	0.47
To Education services, year 5	-0.038	-0.25	0.378	2.37
To Health services, year 5	0.081	0.60	0.339	1.69
To Personal services, year 5	-0.171	-1.32	0.093	0.75
Constant	**-1.238**	**-1.31**	**0.754**	**0.76**
Number of observations	1741		1776	
R-squared (unadjusted)	.225		.360	
F-statistic (p-value)	0.000		0.000	

Notes: The OLS coefficient estimates are weighted by the sampling weights for year 5. The t-ratios given in parentheses are computed using White's (1980) heteroskedasticity robust estimates of the coefficient covariance matrix.

Table C-1: **Estimates of Log-Earnings Growth Equation for Male and Female Graduates, 1986 NGS Cohort, Model 2A, Average Hours Variables Added, Occupation and Industry Excluded**

	Men		*Women*	
Explanatory Variables	Coefficient estimates	(t-ratios)	Coefficient estimates	(t-ratios)
Field of Study				
No field of specialization	-0.037	-0.50	0.030	0.48
Elementary/secondary teaching	-0.135	-2.56	-0.114	-2.69
Other education	-0.100	-1.68	-0.087	-1.52
Fine arts and humanities	-0.133	-2.14	-0.092	-1.92
Commerce	-0.031	-0.65	0.003	0.07
Economics	-0.077	-1.06	-0.135	-1.36
Law	0.119	1.86	-0.034	-0.29
Social sciences (except Economics)	**Reference**			
Agricultural and biological sciences	-0.029	-0.55	-0.068	-1.32
Veterinary sciences	-0.199	-2.18	-0.097	-1.01
Engineering	-0.050	-1.12	-0.053	-0.92
Medical professions (doctors, etc.)	-0.002	-0.01	0.127	1.23
Other health professions (nurses, etc.)	-0.094	-1.37	-0.119	-3.09
Computer sciences	0.006	0.11	0.020	0.37
Mathematical and physical sciences	-0.061	-1.20	-0.063	-1.07
Age in year of graduation				
Age	-0.155	-3.02	-0.069	-1.22
Age-squared	0.003	2.83	0.001	1.20
Coop program	-0.031	-0.88	0.016	0.30
Language first spoken				
English	**Reference**			
French	-0.009	-0.20	0.003	0.06
Neither English nor French	-0.010	-0.31	0.045	0.98
Mother's education				
No formal education	0.008	0.06	0.066	0.28
Elementary education	**Reference**			
Secondary education	-0.021	-0.95	0.000	0.01
College/technical certificate or diploma	0.000	0.01	-0.057	-1.63
University degree (one or more)	-0.019	-0.48	0.043	1.05
Father's education				
No formal education	-0.139	-0.94	0.167	0.91
Elementary education	**Reference**			
Secondary education	0.057	2.36	0.047	1.43
College/technical certificate or diploma	0.019	0.46	0.061	1.26
University degree (one or more)	0.016	0.58	0.030	0.85
Average weekly hours				
Year 2 hours	**-0.063**	-2.45	-0.044	-1.96
Year 2 hours squared	0.001	2.30	0.001	2.00

Year 2 hours cubed	0.000	-2.00	0.000	-1.74
Year 5 hour - year 2 hours	0.006	0.83	0.022	3.31
(Year 5 hours - year 2 hours) * year 2 hours	0.000	-0.05	0.000	-1.26
Class of worker				
Paid employee year 2, Paid employee year 5	**Reference**			
Self-employed year 2, Paid employee year 5	0.613	1.33	-0.492	-3.39
Paid employee year 2, Self-employed year 5	0.831	2.02	-0.512	-4.99
Self-employed year 2, Self-employed year 5	0.621	1.50	-0.712	-5.49
Temporary/permanent job				
Permanent job year 2, Permanent job year 5	**Reference**			
Temporary job year 2, Permanent job year 5	0.048	1.35	0.032	0.80
Permanent job year 5, Temporary job year 5	-0.053	-0.92	-0.146	-2.10
Temporary job year 2, Temporary job year 5	-0.205	-2.24	-0.029	-0.42
Temporary/Permanent Status Unknown	-0.749	-1.84	0.483	10.28
Marital status				
Single year 2, Single year 5	**Reference**			
Single year 2, Married year 5	0.018	0.69	-0.005	-0.19
Single year 2, Other year 5	-0.156	-0.97	0.213	1.31
Married year 2, Married year 5	0.039	1.33	-0.067	-2.10
Married year 2, Other year 5	0.019	0.43	-0.072	-1.04
Other year 2, Married year 5	0.078	0.50	-0.212	-1.84
Other year 2, Other year 5	0.649	1.84	-0.007	-0.05
Presence of children				
No child year 2, No child year 5	**Reference**			
No child year 2, Children year 5	0.017	0.58	-0.101	-3.05
Children year 2, No child year 5	0.021	0.17	0.101	0.84
Children year 2, Children year 5	0.065	1.66	0.033	0.51
Region of residence				
Atlantic Provinces, both years	-0.119	-3.57	-0.119	-3.66
Quebec, both years	-0.094	-1.94	-0.005	-0.09
Ontario, both years	**Reference**			
Manitoba/Saskatchewan, both years	-0.091	-2.32	-0.083	-2.20
Alberta, both years	-0.037	-1.52	-0.095	-2.69
British Columbia, both years	-0.019	-0.45	-0.078	-1.70
To Atlantic Provinces, year 5	-0.101	-0.64	-0.321	-3.60
To Quebec, year 5	-0.199	-2.66	-0.105	-2.14
To Ontario, year 5	-0.094	-1.11	0.047	0.62
To Manitoba/Saskatchewan, year 5	-0.235	-1.53	0.168	0.56
To Alberta, year 5	-0.086	-1.11	-0.190	-2.26
To British Columbia, year 5	-0.002	-0.03	0.005	0.09
Constant	**3.523**	**4.18**	**1.777**	**2.45**
Number of observations	1705		1714	
R-squared (unadjusted)	0.175		0.320	
F-statistic (p-value)	0.000		0.000	

Notes: The OLS coefficient estimates are weighted by the sampling weights for year 5. The t-ratios given in parentheses are computed using White's (1980) heteroskedasticity robust estimates of the coefficient covariance matrix.

Table C-1a: **Estimates of Log-Earnings Growth Equation for Male and Female Graduates, 1986 NGS Cohort, Model 2B, Average Hours Variables Added, Occupation and Industry Included**

Explanatory Variables	*Men*		*Women*	
	Coefficient estimates	(t-ratios)	Coefficient estimates	(t-ratios)
Field of Study				
No field of specialization	-0.106	-1.61	0.026	0.43
Elementary/secondary teaching	-0.096	-1.64	-0.065	-1.15
Other education	-0.063	-0.94	-0.063	-1.07
Fine arts and humanities	-0.113	-1.83	-0.078	-1.69
Commerce	-0.075	-1.60	-0.048	-1.24
Economics	-0.074	-1.04	-0.173	-1.78
Law	0.065	0.80	-0.119	-0.91
Social sciences (except Economics)	**Reference**			
Agricultural and biological sciences	-0.037	-0.70	-0.078	-1.46
Veterinary sciences	-0.454	-2.93	-0.579	-2.44
Engineering	-0.088	-1.53	-0.082	-0.95
Medical professions (doctors, etc.)	-0.328	-2.01	-0.235	-0.86
Other health professions (nurses, etc.)	-0.083	-1.01	-0.176	-3.13
Computer sciences	-0.029	-0.52	-0.020	-0.28
Mathematical and physical sciences	-0.079	-1.50	-0.064	-1.08
Age in year of graduation				
Age	-0.174	-3.59	-0.062	-1.14
Age-squared	0.003	3.38	0.001	1.10
Coop program	-0.031	-0.93	-0.008	-0.14
Language first spoken				
English	**Reference**			
French	-0.016	-0.41	0.014	0.28
Neither English nor French	-0.030	-1.05	0.024	0.54
Mother's education				
No formal education	0.042	0.35	0.056	0.24
Elementary education	**Reference**			
Secondary education	-0.021	-0.97	-0.006	-0.20
College/technical certificate or diploma	0.001	0.04	-0.060	-1.77
University degree (one or more)	0.004	0.12	0.051	1.32
Father's education				
No formal education	-0.161	-1.12	0.163	0.91
Elementary education	**Reference**			
Secondary education	0.070	2.99	0.048	1.49
College/technical certificate or diploma	0.024	0.62	0.085	1.63
University degree (one or more)	0.015	0.56	0.032	0.92
Average weekly hours				
Year 2 hours	**-0.070**	-2.88	-0.044	-1.96
Year 2 hours squared	0.001	2.72	0.001	2.00

Year 2 hours cubed	0.000	-2.45	0.000	-1.75
Year 5 hour - year 2 hours	0.007	1.43	0.020	3.14
(Year 5 hours - year 2 hours) * year 2 hours	0.000	-0.42	0.000	-1.18
Class of worker				
Paid employee year 2, Paid employee year 5	**Reference**			
Self-employed year 2, Paid employee year 5	0.842	2.06	-0.424	-2.53
Paid employee year 2, Self-employed year 5	0.888	2.33	-0.446	-2.90
Self-employed year 2, Self-employed year 5	0.667	1.74	-0.668	-4.05
Temporary/permanent job				
Permanent job year 2, Permanent job year 5	**Reference**			
Temporary job year 2, Permanent job year 5	0.050	1.38	0.052	1.54
Permanent job year 5, Temporary job year 5	-0.039	-0.67	-0.154	-2.22
Temporary job year 2, Temporary job year 5	-0.190	-2.38	-0.048	-0.74
Temporary / Permanent Status Unknown	-0.851	-2.26	0.403	3.31
Marital status				
Single year 2, Single year 5	**Reference**			
Single year 2, Married year 5	0.020	0.78	0.010	0.37
Single year 2, Other year 5	-0.102	-0.86	0.210	1.31
Married year 2, Married year 5	0.034	1.27	-0.060	-2.04
Married year 2, Other year 5	-0.002	-0.04	-0.049	-0.66
Other year 2, Married year 5	0.052	0.38	-0.206	-1.67
Other year 2, Other year 5	0.603	1.83	-0.024	-0.19
Presence of children				
No child year 2, No child year 5	**Reference**			
No child year 2, Children year 5	0.008	0.30	-0.117	-3.67
Children year 2, No child year 5	0.086	0.60	0.120	1.55
Children year 2, Children year 5	0.061	1.71	0.038	0.62
Region of residence				
Atlantic Provinces, both years	-0.124	-3.73	-0.133	-3.97
Quebec, both years	-0.094	-2.19	-0.014	-0.28
Ontario, both years	**Reference**			
Manitoba/Saskatchewan, both years	-0.084	-2.18	-0.090	-2.42
Alberta, both years	-0.033	-1.29	-0.109	-3.22
British Columbia, both years	0.002	0.04	-0.093	-2.01
To Atlantic Provinces, year 5	-0.143	-0.98	-0.325	-4.48
To Quebec, year 5	-0.143	-1.87	-0.080	-1.17
To Ontario, year 5	-0.091	-1.05	0.033	0.51
To Manitoba/Saskatchewan, year 5	-0.201	-1.27	0.152	0.53
To Alberta, year 5	-0.114	-1.53	-0.123	-1.55
To British Columbia, year 5	-0.038	-0.64	-0.032	-0.53
Occupation				
Management, both years	0.108	1.36	-0.103	-1.61
Management related, both years	0.180	2.23	0.049	0.93
Physical/Biological Sciences, both years	0.052	0.62	0.012	0.15
Architecture/Engineering, both years	0.117	1.40	-0.031	-0.37

Mathematics/Computer Science, both years	0.074	0.88	-0.083	-1.29
Sociology/Religion, both years	0.050	0.57	0.068	0.87
Post-Secondary Teaching, both years	-0.056	-0.29	-0.003	-0.02
Elementary/Secondary Teaching, both years	0.115	1.03	-0.141	-1.55
Health Diagnostic Professions, both years	0.484	2.80	0.483	1.84
Other Health Occupations, both years	0.107	0.99	0.144	1.86
Arts/Recreation, both years	0.001	0.01	-0.009	-0.10
Clerical, both years	**Reference**			
Sales, both years	0.055	0.70	-0.069	-0.85
Services, both years	0.082	0.99	-0.066	-0.79
Production, both years	0.044	0.57	-0.030	-0.38
To Management, year 5	0.149	1.92	0.036	0.66
To Management Related, year 5	0.065	0.75	0.017	0.29
To Physical/Biological sciences, year 5	0.211	1.76	0.140	0.81
To Architecture/Engineering, year 5	-0.006	-0.06	0.018	0.22
To Mathematics/Computer Science, year 5	0.036	0.37	-0.066	-1.01
To Sociology/Religion, year 5	0.162	0.89	-0.038	-0.33
To Post-Secondary Teaching, year 5	-0.088	-0.44	-0.082	-0.30
To Elementary/Secondary teaching, year 5	0.410	2.42	-0.050	-0.61
To Health Diagnostic Professions, year 5	0.159	1.03	0.378	1.13
To Other Health Occupations, year 5	-0.557	-1.51	0.198	1.08
To Arts/Recreation, year 5	-0.129	-0.84	-0.128	-1.33
To Clerical, year 5	0.088	0.90	-0.128	-2.09
To Sales, year 5	-0.044	-0.52	-0.007	-0.11
To Services, year 5	-0.045	-0.20	-0.694	-3.00
To Production, year 5	-0.030	-0.33	-0.472	-3.66
Industry				
Primary industries, both years	0.088	1.22	0.107	1.14
Low tech manufacturing, both years	0.295	1.95	0.082	0.84
Medium tech manufacturing, both years	0.125	1.68	0.006	0.07
High tech manufacturing, both years	0.119	1.64	0.042	0.53
Construction, transportation, communication and utilities, both years	0.138	1.88	0.001	0.02
Wholesale trade, both years	0.180	2.53	0.096	0.99
Retail trade, both years	**Reference**			
Finance/Insurance/Real Estate, both years	0.102	1.47	0.025	0.38
Business services, both years	0.230	3.05	0.078	1.02
Government services, both years	0.088	1.27	0.083	1.17
Education services, both years	0.027	0.31	0.060	0.57
Health services, both years	0.187	2.37	-0.128	-1.81
Personal services, both years	0.161	1.60	-0.007	-0.08
To Primary industries, year 5	0.271	2.19	0.022	0.21
To Low tech manufacturing, year 5	0.012	0.10	0.139	1.12
To Medium tech manufacturing, year 5	0.213	2.41	0.470	2.46
To High tech manufacturing, year 5	0.234	3.04	-0.009	-0.10
To Construction, transportation, communication	0.212	2.70	0.134	1.64

and utilities, year 5				
To Wholesale trade, year 5	0.153	1.81	-0.127	-1.17
To Retail trade, year 5	0.083	0.57	-0.152	-1.49
To Finance, insurance, real estate, year 5	0.204	2.37	0.090	0.99
To Business services, year 5	0.071	0.85	-0.041	-0.45
To Government services, year 5	0.217	2.46	0.064	0.71
To Education services, year 5	-0.177	-1.29	0.114	1.10
To Health services, year 5	0.387	2.30	-0.001	-0.01
To Personal services, year 5	0.190	1.82	-0.206	-2.02
Constant	3.682	4.84	1.715	2.45
Number of observations	1706		1714	
R-squared (unadjusted)	0.272		0.383	
F-statistic (p-value)	0.000		0.000	

Notes: The OLS coefficient estimates are weighted by the sampling weights for year 5. The t-ratios given in parentheses are computed using White's (1980) heteroskedasticity robust estimates of the coefficient covariance matrix.

Table C-2: **Estimates of Log-Earnings Growth Equation for Male and Female Graduates, 1990 NGS Cohort, Model 2A, Average Hours Variables Added, Occupation and Industry Excluded**

	Men		*Women*	
Explanatory Variables	Coefficient estimates	(t-ratios)	Coefficient estimates	(t-ratios)
Field of Study				
No field of specialization	-0.074	-1.29	0.142	1.53
Elementary/secondary teaching	-0.098	-1.50	-0.126	-3.19
Other education	-0.032	-0.51	-0.018	-0.38
Fine arts and humanities	0.099	1.29	0.072	1.36
Commerce	0.024	0.40	-0.007	-0.17
Economics	0.006	0.07	0.059	0.60
Law	-0.068	-0.69	-0.014	-0.18
Social sciences (except Economics)	**Reference**			
Agricultural and biological sciences	-0.002	-0.03	0.051	1.20
Veterinary sciences	0.009	0.11	0.091	0.83
Engineering	-0.030	-0.54	-0.038	-0.70
Medical professions (doctors, etc.)	0.161	1.51	0.221	2.11
Other health professions (nurses, etc.)	-0.135	-2.12	-0.055	-1.64
Computer sciences	0.005	0.07	-0.026	-0.57
Mathematical and physical sciences	0.025	0.41	-0.007	-0.14
Age in year of graduation				
Age	0.058	0.79	-0.018	-0.23
Age-squared	-0.001	-0.89	0.000	0.07
Coop program	0.003	0.13	0.029	0.84
Language first spoken				
English	**Reference**			
French	-0.112	-1.77	-0.019	-0.65
Neither English nor French	-0.012	-0.32	0.022	0.47
Mother's education				
No formal education	-0.154	-1.03	0.220	1.62
Elementary education	**Reference**			
Secondary education	0.043	1.46	0.019	0.60
College/technical certificate or diploma	0.064	1.59	0.022	0.64
University degree (one or more)	0.032	0.76	0.004	0.09
Father's education				
No formal education	0.163	1.94	-0.117	-1.38
Elementary education	**Reference**			
Secondary education	0.016	0.51	-0.046	-1.52
College/technical certificate or diploma	-0.043	-0.92	-0.068	-1.42
University degree (one or more)	0.002	0.05	-0.030	-0.92
Average weekly hours				
Year 2 hours	**-0.011**	-0.52	-0.045	-2.40
Year 2 hours squared	0.000	0.87	0.001	3.04

Year 2 hours cubed	0.000	-1.04	0.000	-3.27
Year 5 hour - year 2 hours	0.030	4.67	0.031	6.98
(Year 5 hours - year 2 hours) * year 2 hours	0.000	-3.54	0.000	-3.78
Class of worker				
Paid employee year 2, Paid employee year 5	**Reference**			
Self-employed year 2, Paid employee year 5	-0.031	-0.29	-0.265	-2.13
Paid employee year 2, Self-employed year 5	0.124	2.02	0.055	0.82
Self-employed year 2, Self-employed year 5	0.035	0.42	-0.207	-1.79
Temporary/permanent job				
Permanent job year 2, Permanent job year 5	**Reference**			
Temporary job year 2, Permanent job year 5	0.030	0.65	0.123	3.23
Permanent job year 5, Temporary job year 5	-0.106	-1.48	-0.146	-1.75
Temporary job year 2, Temporary job year 5	-0.101	-0.77	0.064	0.93
Temporary / Permanent Status Unknown	-0.232	-1.20	0.079	0.53
Marital status				
Single year 2, Single year 5	**Reference**			
Single year 2, Married year 5	-0.012	-0.32	0.017	0.55
Single year 2, Other year 5	-0.037	-0.41	0.050	0.64
Married year 2, Married year 5	0.003	0.09	-0.010	-0.31
Married year 2, Other year 5	0.039	0.66	-0.056	-1.33
Other year 2, Married year 5	-0.052	-0.38	0.326	2.31
Other year 2, Other year 5	0.532	4.73	0.086	0.52
Presence of children				
No child year 2, No child year 5	**Reference**			
No child year 2, Children year 5	0.037	1.05	-0.061	-1.79
Children year 2, No child year 5	-0.296	-1.61	0.041	0.68
Children year 2, Children year 5	-0.056	-1.25	-0.041	-0.99
Region of residence				
Atlantic Provinces, both years	0.016	0.40	0.036	0.70
Quebec, both years	0.102	1.44	0.063	2.13
Ontario, both years	**Reference**			
Manitoba/Saskatchewan, both years	0.081	1.74	0.039	1.09
Alberta, both years	0.077	2.12	0.007	0.19
British Columbia, both years	0.094	2.23	0.035	0.89
To Atlantic Provinces, year 5	0.148	1.61	-0.044	-0.52
To Quebec, year 5	0.081	1.04	0.052	0.57
To Ontario, year 5	0.139	1.58	0.030	0.29
To Manitoba/Saskatchewan, year 5	-0.228	-1.06	0.001	0.01
To Alberta, year 5	0.012	0.17	-0.136	-0.73
To British Columbia, year 5	0.222	2.03	0.356	1.46
Constant	**-0.502**	**-0.48**	**0.938**	**0.90**
Number of observations	1741		1775	
R-squared (unadjusted)	0.177		0.319	
F-statistic (p-value)	0.000		0.000	

Notes: The OLS coefficient estimates are weighted by the sampling weights for year 5. The t-ratios given in parentheses are computed using White's (1980) heteroskedasticity robust estimates of the coefficient covariance matrix.

Table C-2a: **Estimates of Log-Earnings Growth Equation for Male and Female Graduates, 1990 NGS Cohort, Model 2B, Average Hours Variables Added, Occupation and Industry Included**

	Men		*Women*	
Explanatory Variables	Coefficient estimates	(t-ratios)	Coefficient estimates	(t-ratios)
Field of Study				
No field of specialization	-0.092	-1.56	0.117	1.34
Elementary/secondary teaching	-0.096	-1.14	-0.070	-1.50
Other education	-0.036	-0.57	-0.006	-0.13
Fine arts and humanities	0.110	1.39	0.071	1.44
Commerce	-0.008	-0.14	-0.033	-0.83
Economics	-0.015	-0.20	0.013	0.17
Law	-0.097	-0.85	-0.058	-0.69
Social sciences (except Economics)	**Reference**			
Agricultural and biological sciences	-0.037	-0.51	0.034	0.77
Veterinary sciences	-0.123	-1.00	0.232	1.62
Engineering	-0.051	-0.79	-0.007	-0.12
Medical professions (doctors, etc.)	0.131	0.95	0.376	2.11
Other health professions (nurses, etc.)	-0.232	-3.11	-0.139	-2.24
Computer sciences	-0.043	-0.63	-0.030	-0.45
Mathematical and physical sciences	0.007	0.12	0.002	0.03
Age in year of graduation				
Age	0.093	1.31	-0.029	-0.40
Age-squared	-0.002	-1.40	0.000	0.25
Coop program	-0.017	-0.73	-0.005	-0.15
Language first spoken				
English	**Reference**			
French	-0.089	-1.66	0.009	0.33
Neither English nor French	0.001	0.03	0.012	0.30
Mother's education				
No formal education	-0.208	-1.55	0.266	2.12
Elementary education	**Reference**			
Secondary education	0.046	1.61	0.012	0.41
College/technical certificate or diploma	0.069	1.87	0.008	0.23
University degree (one or more)	0.037	0.89	-0.025	-0.64
Father's education				
No formal education	0.117	1.48	-0.214	-2.26
Elementary education	**Reference**			
Secondary education	0.016	0.54	-0.048	-1.73
College/technical certificate or diploma	-0.053	-1.15	-0.054	-1.21
University degree (one or more)	-0.010	-0.27	-0.005	-0.17
Average weekly hours				
Year 2 hours	**-0.009**	-0.46	-0.047	-3.24
Year 2 hours squared	0.000	0.75	0.001	4.14

Year 2 hours cubed	0.000	-0.87	0.000	-4.40
Year 5 hour - year 2 hours	0.028	5.02	0.032	7.62
(Year 5 hours - year 2 hours) * year 2 hours	0.000	-3.54	0.000	-4.33
Class of worker				
Paid employee year 2, Paid employee year 5	**Reference**			
Self-employed year 2, Paid employee year 5	-0.078	-0.68	-0.245	-2.07
Paid employee year 2, Self-employed year 5	0.122	1.99	0.067	0.92
Self-employed year 2, Self-employed year 5	0.027	0.37	-0.198	-1.69
Temporary/permanent job				
Permanent job year 2, Permanent job year 5	**Reference**			
Temporary job year 2, Permanent job year 5	0.029	0.62	0.111	3.17
Permanent job year 5, Temporary job year 5	-0.129	-2.03	-0.178	-2.46
Temporary job year 2, Temporary job year 5	-0.100	-0.81	0.027	0.46
Temporary / Permanent Status Unknown	-0.237	-1.12	0.010	0.09
Marital status				
Single year 2, Single year 5	**Reference**			
Single year 2, Married year 5	-0.018	-0.50	0.011	0.40
Single year 2, Other year 5	-0.070	-0.91	0.175	1.97
Married year 2, Married year 5	0.000	0.00	-0.010	-0.34
Married year 2, Other year 5	0.036	0.57	-0.064	-1.27
Other year 2, Married year 5	-0.071	-0.54	0.295	2.15
Other year 2, Other year 5	0.540	5.45	0.066	0.41
Presence of children				
No child year 2, No child year 5	**Reference**			
No child year 2, Children year 5	0.033	1.03	-0.046	-1.48
Children year 2, No child year 5	-0.366	-1.91	-0.003	-0.06
Children year 2, Children year 5	-0.050	-1.17	-0.044	-1.19
Region of residence				
Atlantic Provinces, both years	0.027	0.69	0.004	0.11
Quebec, both years	0.108	1.72	0.044	1.41
Ontario, both years	**Reference**			
Manitoba/Saskatchewan, both years	0.095	2.01	0.003	0.10
Alberta, both years	0.067	1.78	-0.002	-0.07
British Columbia, both years	0.095	2.21	0.043	1.15
To Atlantic Provinces, year 5	0.136	1.60	-0.039	-0.47
To Quebec, year 5	0.114	1.21	-0.031	-0.49
To Ontario, year 5	0.145	1.83	0.013	0.16
To Manitoba/Saskatchewan, year 5	-0.214	-1.02	0.004	0.03
To Alberta, year 5	0.016	0.19	-0.163	-1.01
To British Columbia, year 5	0.211	2.07	0.319	1.49
Occupation				
Management, both years	0.180	1.24	-0.014	-0.31
Management related, both years	0.167	1.20	0.019	0.41
Physical/Biological Sciences, both years	0.091	0.73	-0.119	-2.03
Architecture/Engineering, both years	0.153	1.18	-0.109	-1.33

Mathematics/Computer Science, both years	0.186	1.45	0.026	0.34
Sociology/Religion, both years	0.141	1.08	-0.045	-0.80
Post-Secondary Teaching, both years	-0.305	-0.93	-0.479	-1.51
Elementary/Secondary Teaching, both years	0.093	0.69	-0.123	-1.96
Health Diagnostic Professions, both years	0.210	1.17	-0.220	-1.43
Other Health Occupations, both years	0.323	2.34	0.065	0.96
Arts/Recreation, both years	0.176	1.15	-0.078	-0.89
Clerical, both years	**Reference**			
Sales, both years	0.242	1.51	-0.200	-1.74
Services, both years	0.241	1.66	0.176	2.08
Production, both years	0.145	0.98	0.003	0.04
To Management, year 5	0.220	1.70	-0.024	-0.44
To Management Related, year 5	0.232	1.77	-0.038	-0.54
To Physical/Biological sciences, year 5	0.110	0.86	-0.001	-0.01
To Architecture/Engineering, year 5	0.155	1.17	-0.036	-0.40
To Mathematics/Computer Science, year 5	0.181	1.13	0.161	1.75
To Sociology/Religion, year 5	-0.030	-0.18	-0.062	-0.71
To Post-Secondary Teaching, year 5	0.327	1.06	-0.494	-2.73
To Elementary/Secondary teaching, year 5	0.239	0.79	0.301	1.84
To Health Diagnostic Professions, year 5	0.852	2.05	-0.404	-1.14
To Other Health Occupations, year 5	0.081	0.53	0.243	1.19
To Arts/Recreation, year 5	0.082	0.51	0.191	1.37
To Clerical, year 5	0.344	1.81	-0.037	-0.25
To Sales, year 5	0.187	1.26	-0.020	-0.26
To Services, year 5	0.160	1.01	-0.421	-2.61
To Production, year 5	-0.003	-0.02	-0.347	-1.39
Industry				
Primary industries, both years	0.111	1.05	-0.029	-0.45
Low tech manufacturing, both years	-0.151	-1.58	-0.119	-1.76
Medium tech manufacturing, both years	0.027	0.31	0.041	0.57
High tech manufacturing, both years	-0.003	-0.04	0.056	1.14
Construction, transportation, communication and utilities, both years	-0.017	-0.21	-0.003	-0.05
Wholesale trade, both years	-0.218	-1.50	-0.039	-0.56
Retail trade, both years	**Reference**			
Finance/Insurance/Real Estate, both years	-0.028	-0.37	0.062	1.41
Business services, both years	0.067	0.89	0.053	0.87
Government services, both years	-0.046	-0.58	-0.072	-1.47
Education services, both years	0.057	0.58	0.014	0.25
Health services, both years	-0.055	-0.70	0.018	0.44
Personal services, both years	0.031	0.29	0.087	1.41
To Primary industries, year 5	0.332	2.99	0.080	0.51
To Low tech manufacturing, year 5	0.010	0.08	-0.090	-0.60
To Medium tech manufacturing, year 5	0.010	0.05	-0.133	-1.51
To High tech manufacturing, year 5	0.127	1.31	0.344	1.98
To Construction, transportation, communication	0.053	0.44	0.173	1.07

and utilities, year 5				
To Wholesale trade, year 5	-0.019	-0.15	0.202	2.20
To Retail trade, year 5	-0.230	-1.53	-0.321	-2.62
To Finance, insurance, real estate, year 5	0.006	0.05	0.160	1.71
To Business services, year 5	-0.017	-0.18	-0.172	-1.22
To Government services, year 5	0.279	2.51	0.041	0.56
To Education services, year 5	-0.006	-0.04	0.354	2.64
To Health services, year 5	0.071	0.53	0.211	1.25
To Personal services, year 5	-0.190	-1.59	0.086	1.02
Constant	**-1.118**	**-1.07**	**1.072**	**1.16**
Number of observations	1741		1775	
R-squared (unadjusted)	0.237		0.413	
F-statistic (p-value)	0.000		0.000	

Notes: The OLS coefficient estimates are weighted by the sampling weights for year 5. The t-ratios given in parentheses are computed using White's (1980) heteroskedasticity robust estimates of the coefficient covariance matrix.

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